ORGANIZATION AND MANAGEMENT OF MISSILE PROGRAMS

Part I—Department of Defense
Part II—Air Defense
Part III—Air Force

THE UNIVERSITY
OF MICHIGAN

AUG 10 1960

MAIN
READING ROOM

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON GOVERNMENT OPERATIONS HOUSE OF REPRESENTATIVES

EIGHTY-SIXTH CONGRESS

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ORGANIZATION AND MANAGEMENT OF MISSILE PROGRAMS

Part I—Department of Defense

TUESDAY, MAY 3, 1960

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON MILITARY OPERATIONS OF THE
COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met at 10 a.m., in room 1501–B, New House Office Building, Hon. Chet Holifield (chairman of the subcommittee) presiding.

Present: Representatives Chet Holifield, chairman; Martha W. Griffiths, and R. Walter Riehlman.

Also present: Herbert Roback, staff administrator; Douglas Dahlin and Paul Ridgely, staff members.

Mr. HOLIFIELD. The subcommittee will be in order.

This hearing is the first of 4 days of hearings in which the Military Operations Subcommittee will review the developments in missile and related programs since we issued House Report No. 1121 in September of last year. That report examined in a systematic way a broad range of problems relating to the organization and the management of missile and space programs and made certain recommendations.

One basic recommendation was pointed toward a merger of the Army and the Air Force in the missile age, when the ICBM, as the dominant strategic weapon for deterrence and defense, does not need pilots and flight crews to handle it.

It was no surprise that the Department of Defense and the military departments were less than enthusiastic about the merger recommendation. Nevertheless they have taken several steps to reorganize or reassign the missile and space functions of the military services, and we will hear about these developments this morning.

Another basic recommendation by the subcommittee was pointed toward a reorganization of ballistic missile management in the Air Force. A corporation known as Space Technology Laboratories, Inc., a 100-percent subsidiary of Thompson Ramo Wooldridge, serves in the capacity of technical manager for the Air Force programs.

This close and rather unique relationship between a Government agency and a private corporation has given rise to various problems which we detailed in our report, and we recommended that if the close relationship is to continue, the private corporation should become nonprofit.

The Air Force set up a special committee to consider this problem, and the results of that effort and the Air Force decisions subsequently made, will be examined in our hearing on Friday.

We plan to proceed as follows: Today we will hear the Honorable James H. Douglas, Deputy Secretary of Defense, who is accompanied by the Honorable Herbert F. York, Director of Defense Research and Engineering, Gen. Austin W. Betts, Director of Advanced Research Projects Agency, and other supporting witnesses. We will ask these witnesses to review the reorganization of space and missile functions on a Defense-wide basis, the transfer of space projects to the National Aeronautics and Space Administration, the present status and role of ARPA, and NATO and British relationships with respect to missile developments.

Tomorrow, Wednesday, May 4, we will review recent developments in air defense, including the status of programs for defense against manned aircraft, new devices for early warning, and defense against intercontinental ballistic missiles.

Witnesses will include Dr. J. P. Ruina, Assistant Director to Dr. York; Maj. Gen. H. M. Estes, Assistant Air Force Deputy Chief of Staff for Operations; and Maj. Gen. B. K. Holloway, Air Force Director of Operational Requirements.

On Thursday, May 5, the subcommittee will review applicable laws and regulations which exempt certain Department of Defense personnel from the so-called conflict-of-interest statutes. The subcommittee made an inquiry into this matter when the Secretary of Defense then in office, Mr. Neil McElroy, announced that the new director of ARPA would be Dr. Charles L. Critchfield, a Convair research scientist who would continue to draw his $40,000 a year salary from General Dynamics Corp.

Subsequently Dr. Critchfield withdrew, but the subcommittee wants to get a clearer picture of the Department of Defense practice in appointing personnel exempted from the conflict-of-interest statutes. Mr. Leon L. Wheeless from the office of the Assistant Secretary, Manpower, Personnel and Reserve, will testify.

In this connection, we will take the opportunity to review the employment relationships between the Advanced Research Projects Agency and the Institute for Defense Analysis. In our aforementioned report, the subcommittee expressed concern about possible conflicting interests in the roles of industrial contractor employees serving tours of duty with IDA. Mr. Garrison Norton, president, and Dr. Albert Hill, chairman of the professional committee of IDA, will tell us how they have dealt with this situation.

On Friday, May 6, we will review the reorganization of the Air Force ballistic-missile management setup which I mentioned earlier. The Honorable Joseph V. Charyk, Under Secretary of the Air Force, and Lt. Gen. B. A. Schriever, Commanding General of the Air Research and Development Command, will testify.

In cases where the time runs short, we may have some afternoon sessions. We have to finish this set of hearings this week because next week we are scheduled to review developments in military air transportation.

Later in the month we may hold additional hearings on Air Force ballistic-missile management, if and when the Comptroller General

submits a report to the Congress on this matter. I have advised the Comptroller General of these hearings and have asked him to have representatives stand by for possible questions on the report, which has been in the making since the Comptroller General announced an investigation about a year and a half ago. He has advised me by a letter that he expects to issue his report during the week of May 16.

Mr. Secretary, I wish to express the appreciation of the committee for your attendance here this morning and Dr. York, and General Betts. I see you have a prepared statement and you may proceed.

STATEMENT OF HON. JAMES H. DOUGLAS, DEPUTY SECRETARY OF DEFENSE

Secretary DOUGLAS. Mr. Chairman, members of the committee, I am very happy to be with this committee again. I appreciate the opportunity to appear to discuss the organization and management of our Defense missile and space programs.

It is my understanding that you wish to consider the following specific subjects:

1. Defense-wide reorganization of space and missile functions.
2. Transfer of space projects to NASA and assignment of military space functions.
3. Current status of ARPA.
4. New missile and space projects.
5. NATO and British missile developments.

With respect to reorganization of space and missile functions, I believe it would be helpful to review briefly the organizational arrangements that existed within the Department of Defense for carrying out missile and space programs prior to September of last year.

The Advanced Research Projects Agency as the principal DOD space agency was managing the SAMOS, MIDAS, Discoverer, NOTUS and Transit satellite programs and the Saturn large-thrust booster project. The SAMOS, MIDAS, Discoverer, and NOTUS programs were handled by ARPA through the Air Force; Transit through the Navy and Saturn through the Army's Ballistic Missile Agency.

TRANSFER OF SPACE PROJECTS

By direction of the Secretary of Defense on September 23, 1959, a plan for the progressive and orderly transfer of space projects from ARPA to the military departments was initiated. This plan assigns to the Air Force responsibility for the development, production, and launching of military space boosters; and for the separate assignment to the military departments on the basis of primary interest or special competence, of the development responsibilities for payloads and specialized ground support equipment for space and satellite systems.

Specific assignments for development of payloads have been made on MIDAS (early warning satellite), SAMOS (reconnaissance satellite), and Discoverer (engineering research satellite) to the Air Force. Transfer of the Transit (navigation satellite) and NOTUS (communication satellite) projects to designated military departments is anticipated sometime during the current fiscal year.

Actually, transfer of Transit to the Navy is anticipated in the very near future and NOTUS will be transferred to the Army.

The development of the very large thrust booster, as you know, has been assigned by the President to NASA. In accord with this decision, the large clustered space booster Saturn and the Development Operations Division of the Army Ballistic Missile Agency were transferred to NASA.

This does not mean that the Department of Defense has no interest in large boosters. We are very much interested in their development for the scientific investigation and exploration of space, and for possible military uses that are not clear today. Therefore, we strongly endorse the NASA program for large boosters.

We also will follow closely other NASA projects— TIROS (meteorological satellite) and Mercury (man in space). Both of these have military applications potentially. To accomplish this there are now several DOD–NASA working groups which provide on a day-to-day basis essential liaison for the exchange of information on requirements and technical knowledge on projects of mutual interest.

NASA–DOD LIAISON

I am satisfied that the most effective coordination of programs and activities between NASA and the Defense Department can be accomplished by direct communication between those having management responsibilities at various levels and in particular areas. No substitute can be provided for direct and frequent communication between the Administrator, his Deputy, and his Associate Administrator, and the Secretary of Defense, myself, and the Director of Defense Research and Engineering.

We are establishing, to assure a continuing prompt exchange of information and to coordinate development programs of mutual interest, an Activities Coordinating Board with the Deputy Administrator and the Director of Defense Research and Engineering as cochairmen, assisted by NASA and Defense officials appropriate to special areas calling for coordination such as launch vehicles, aerospace medicine, aeronautics, and payloads of mutual interest. These officials may be chairmen of panels to deal in such areas as those mentioned. I believe this board will be fully effective since it would carry the authority of its cochairmen who are within their respective agencies managers of the activities to be coordinated.[1]

STATUS OF ARPA

To better coordinate ARPA projects with other research programs, we have placed ARPA directly under the Director of Defense Research and Engineering by DOD Directive of December 1959. A copy of this directive can be included in the record if you so desire.[2] ARPA continues to be responsible for important research programs and in particular for research in solid propellant chemistry which will contribute to future rocket developments for missiles and space flight.

[1] This Board has not yet been established by formal DOD directive.
[2] See app. III, p. 180.

During the last year, ARPA has also been assigned responsibilities in the field of advanced materials research and also research relating to techniques for inspection of a possible nuclear test ban. ARPA is continuing work on the problems of detection, identification, intercept and kill of ballistic missiles with a view to extending the current state of technical knowledge.

In addition to the primary assignments, ARPA has retained management responsibility for certain space programs pending their transfer to the appropriate military departments or agencies. These include the communications satellite NOTUS; the navigation satellite, Transit—both of which I have referred to—and the satellite tracking and data acquisition program: SPASUR, a detection fence project; Spacetrack, a central catalog of all satellites, and a program for installation of tracking and data collection devices overseas.

The clarification of ARPA's role and mission and the transfers of projects both to NASA and to the military departments will permit ARPA to devote increasing attention to projects of an advanced research nature which are of interest to all three military departments and which should be centrally managed.

CENTRAL CONTROL OF MISSILE FACILITIES

The national missile ranges and tracking stations of both NASA and the Defense Department have been used heavily in support of space launchings for both agencies. In order to make the most effective use of these facilities, a comprehensive study in the area of integrated range support for missiles and space vehicles has been completed. As a result of this study, Maj. Gen. Donald N. Yates, formerly commander of the Atlantic Missile Range at Cape Canaveral, Fla., has been designated as a Deputy Director of Defense Research and Engineering for Ranges and Space Ground Support, under Dr. York, to provide central supervision of the military missile and satellite ranges.

Reporting to General Yates will be an assistant director whose duties have been assigned under a DOD instruction dated April 7, 1960. A copy of this instruction can be included in the record if you so desire.[3] This office will provide centralized information, coordination of planning and schedules, assurance of adequate support, and avoidance of wasteful duplication.

MISSILE SUCCESSES

Before discussing new missile and space projects I would like to mention briefly the highly gratifying successes which have stemmed from some of our earlier programs. Namely, the latest in the Pioneer deep space probe series which was launched by NASA in March. The Pioneer series was begun by the Air Force under ARPA direction. The recent TIROS shot, launched by NASA and also started by ARPA, is developing meteorological data useful for military as well as civilian purposes; and the Transit shot, launched April 13, under ARPA direction and representing a joint effort of the three services, with the Navy having primary interest, which has been extremely successful in proving out the concept of using a satellite for navigational purposes.

[3] See app. III, p. 192.

NEW MISSILE PROJECTS

With respect to missiles, our new projects are: The Navy Super Talos, now designated the Typhon; the Air Force Skybolt, an approved development project for an air launched ballistic missile; and the Army Shillelagh, a lightweight missile system for close-in support of troops.

I would also like to mention the Air Force Dynasoar program. This program, which is in the early development stage, is designed to provide a manned, maneuverable, rocket-powered, boost-glide vehicle capable of near orbital speeds and controlled landings.

NATO AND BRITISH MISSILE DEVELOPMENTS

In reference to the NATO and British missile developments, many of the NATO countries have national guided missile programs. In the case of France and the United Kingdom, these are quite broad in scope and cover a variety of missile types. Some of these NATO missile programs are supported in part through our MWDP and MAP programs and technical liaison is maintained.

Considerable progress has been made in coordinating the United Kingdom program with the United States through the tripartite organization which includes Canada. As an example, the air-launched ballistic missile—the Air Force development referred to—Skybolt, from its inception has had incorporated in its military requirements compatibility with the British V bombers and we have agreed to make this weapon available to the United Kingdom.

The United Kingdom has also been able to achieve an early IRBM capability through the U.S. developed and produced Thor. Four squadrons will be deployed in England, all to be manned and operated by the Royal Air Force. The first three of these were turned over to the Royal Air Force—in June, September, and December of 1959 and the fourth is scheduled for later this month. On December 9, 1959, announcement was made to the British Parliament that the Thor was considered an operationally reliable system and had taken its place in the first line of British defenses.

Including weapon system development tests and various unrelated space missions, a substantial number of Thors have been launched. This weapon system test program has been completed with all objectives satisfactorily met.

Several of the NATO countries have requirements for a mid-range ballistic missile. Through NATO, these requirements have been consolidated and defined by General Norstad and confirmed by the U.S. Joint Chiefs of Staff. In response, the Department of Defense, in coordination with the State Department, has submitted for NATO consideration a proposal designed to fulfill this requirement. This proposal, which is based on a Polaris missile, is currently under study by the NATO Council.

Mr. Chairman, this completes my introductory comments on the subjects which you indicated you desired to discuss. Dr. York, the Director of Defense Research and Engineering, General Betts, the Director of the Advanced Research Projects Agency, and I will be glad to answer questions of the committee.

Mr. HOLIFIELD. Thank you, Mr. Secretary.

As I understand it, there are no other prepared statements?

Secretary DOUGLAS. That is correct.

Mr. RIEHLMAN. Mr. Chairman.

Mr. HOLIFIELD. Mr. Riehlman?

Mr. RIEHLMAN. I would like to ask to be excused to go to another committee meeting for just a brief time devoted to another piece of legislation. I will try to return as soon as I can. Good to see you, Secretary Douglas, Dr. York, General Betts.

Secretary DOUGLAS. Good to see you, sir.

Mr. HOLIFIELD. Mr. Secretary and Dr. York and General Betts, we want to go into some detail on several matters under discussion in order that this committee and the Congress may better understand some of the problems that are involved in your daily work.

We realize they are complicated, and it is difficult even for a Member of Congress who has been trying to follow these important projects to keep up with them.

We will start in with the status of authority at the Office of the Secretary of Defense level.

CENTRAL CONTROL OF MISSILE FACILITIES

My first question is: What are the implications of the assignment to Dr. York as space chief?

Secretary DOUGLAS. Dr. York's authority is his authority in the statutory position of Defense Director of Research and Engineering, which covers the whole span of Defense Department research and development activities.

In this capacity he has authority over the development of space projects just as he has over weapons projects that may be for weapons systems that are land based or sea based.

Now, I am not quite sure, Mr. Chairman, what you have in mind beyond that in referring to him as the space chief.

Mr. HOLIFIELD. Well, is it correct to say that Dr. York was appointed to bring into a centralized control or a coordinated control, at least, all the functions in space?

Secretary DOUGLAS. No; I would say all of the functions of developing space items and space activities. Now, what you refer to is the establishment of the ranges and ground support function, which is assigned to Dr. York and which has been set up by him under General Yates as a new deputy, for that purpose.

This office has been under consideration for some time. Other methods of establishing it were suggested and considered, but it seemed to all of us that it best belonged in Dr. York's field of responsibility because he had almost complete responsibility for the things that we wanted coordinated, including development. And those things amount to complete information on all ground support facilities, complete information on broad plans, including scheduling. So that he may see to it in this new office that plans for testing space missiles or other vehicles are fully coordinated and that the requirements in the way of ground support are being provided and not overprovided.

In addition to the information and the coordination of the ground support and also the information, it is his responsibility, while the

space projects are in the development stage, to fully coordinate them in that office.

Mr. HOLIFIELD. My question was based on, among other things, an article that appeared in the New York Times on April 7 which had a headline as follows:

GATES NAMES YORK SPACE CHIEF IN MOVE TO END SERVICE RIVALRY

Secretary Thomas S. Gates, Jr., placed the widely dispersed space probing bases under tight central direction today. It was a move to quash interservice disputes. The Secretary put Dr. Herbert F. York, Director of Research and Engineering, in overall charge of the billion dollar complex of sites for military missiles and space launchings, radar tracking installations. He brought Maj. Gen. Donald N. Yates, commander of the Cape Canaveral, Fla., launching base, to be Dr. York's deputy in charge of the centralized operations.

It reports further that the Pentagon announcement said that the reorganization was intended to use national resources more effectively through the elimination of unnecessary duplication.

Mr. ROBACK. Mr. Chairman, can we inquire about the rivalry which this type of organization is supposed to be coping with?

Secretary DOUGLAS. I think really the rivalry that existed at the start of satellite programs, when there was no clear coordinating source, was brought under control by the establishment of ARPA and the assignment of the satellite and certain other space programs to ARPA.

Since then the services have had a clear understanding of what their responsibilities would be in the principal satellite space programs.

As I have indicated in my statement, the military programs that we are immediately interested in have to do with early warning, communications, reconnaissance.

Mr. HOLIFIELD. Tracking?

Secretary DOUGLAS. And navigation.

Mr. ROBACK. Is this a changed concept for ARPA?

Dr. YORK. ARPA is not involved.

Secretary DOUGLAS. ARPA is not involved in this, except that it is a change unless one recognizes, which I think one should, that the ARPA development responsibility was a temporary responsibility to be assigned out to the interested services so that the developer and the operator would become the same.

Now, the important purpose or—I have indicated three important purposes, but the purpose that is referred to, I think, and with which the article is concerned that you read, is the avoidance of unnecessary duplication in ground support facilities and it has been possible for the projects in the fields I have referred to, to generate stated requirements for facilities for tracking and ground support that need to be fully coordinated to avoid getting systems that provide more support than is required and provide support which is not fully coordinated.

Mr. HOLIFIELD. In providing the common use of facilities, for instance, for both the Navy's program, let us say at Point Mugu, and the Vandenberg Air Base program, you would have some type of common support to the point where the operation of the Polaris missiles would be separate from the operation of the Atlas missiles or the Thor?

Secretary DOUGLAS. Well, the testing phase, of course, is the development phase. Dr. York has really had the authority to approve and disapprove test programs, but he hasn't had, until now, perhaps

because of the several organizations that existed in the past, including a guided missile office and ARPA, in his office, the personnel and the tools to fully coordinate test programs, and this we think provides that authority and that machinery.

Of course, we are talking about the big missile programs, the space boosters, we are not talking about small surface to surface missiles that are also missile test programs.

ELIMINATION OF DUPLICATING PROGRAMS

Mr. HOLIFIELD. Can you tell the committee that through this organizational setup which now seems to be established or on the point of being established, that you have ended duplication in these different research and development fields?

Secretary DOUGLAS. My view of it is we are preventing duplications that might very well arise except for the establishment of this office and it may be that there are already plans——

Mr. HOLIFIELD. Existing programs which are duplicated——

Secretary DOUGLAS. Commitments which we have to take charge of that don't need to be carried out.

Mr. HOLIFIELD. In other words, there may be existing projects and contracts which you are obligated in some way either to continue or liquidate, in order to prevent existing duplication or potential duplication.

Secretary DOUGLAS. I would like to ask Dr. York to respond to that question.

Dr. YORK. Well, the matters which are referred to in the newspaper articles of April 7th and thereabouts are in connection with ranges and ground support, not space programs overall or space programs in toto, but just the ranges and the ground support of these, where the objective is to enable the United States, in the most efficient way, to make use of those facilities it has already got and to develop only such new facilities as are really needed, but to develop all such new facilities as are really needed.

Again this particular directive or instruction that was issued just prior to April 7 referred to ground support and ranges only.

With respect to the space programs as distinct from the ground support of the space programs we have been endeavoring for the past year to eliminate any unnecessary duplication and looking at it from a positive point of view to have those things initiated which are needed.

This means—this requires coordination not only within the Department of Defense and certain decisions to be made not only within the Department of Defense, but also between the Department of Defense and the civil space agency, NASA.

The great majority of the clarifying decisions that were needed have already been made over the past year.

CISLER STUDY OF MISSILE RANGES

Mr. ROBACK. Did this report grow out of a study made by Walker Cisler for the Secretary of Defense?

Dr. YORK. The instruction which was issued grew out of—was based in part on a study made by Mr. Cisler for the Secretary. The newspaper articles grew out of a press briefing that was held at the time the instruction was issued.

Mr. ROBACK. Do you have any objection to supplying a copy of that report to the committee?

Dr. YORK. The Cisler report?

Mr. ROBACK. Yes.

Dr. YORK. Mr. Cisler never wrote a final report, but wrote some letters to the Secretary and held numerous conversations with the Secretary and with groups which included myself and Dr. Glennan and others.

Mr. ROBACK. We were advised some months ago when we were inquiring into special exemptions from conflict-of-interest statutes, and we are not raising that issue here, that Walker Cisler was retained by Secretary McElroy.

Dr. YORK. That is correct.

Mr. ROBACK. He also had with him the vice president and manager of union relations for the Detroit Edison Co., Donald F. Kigar, and a secretary named Evelyn M. Lehman, to help him.

You say he never issued a report?

Dr. YORK. I am not——

Secretary DOUGLAS. Well, I think I could answer that.

Dr. YORK. All right.

Secretary DOUGLAS. He submitted a very brief summary of recommendations that to my recollection covered not more than three typewritten pages, and it was, I think, treated by him as a tentative report showing the direction of his thinking.

The report and the discussions that the Secretary and Dr. York and I had with Mr. Cisler went into great detail as to the examination of the whole problem as he saw it. And his report contributed very materially to the form and character of the office that we set up.

The difference between his approach to the problem and finding a solution in setting up an office was substantially, in his recommendation, that a special assistant to the Secretary of Defense, with an office outside of existing offices, be created.

And after careful consideration, we reached the conclusion that we thought much better coordination would be achieved in this problem by having this aspect of coordinating space and missile activities, that is the ground support element, would be better handled in a single office.

Mr. ROBACK. Do you know why he was chosen? Mr. Cisler has spent a good part of his public service selling atomic reactor ideas. Why he was chosen for this particular problem?

Secretary DOUGLAS. I do not know.

Mrs. GRIFFITHS. May I ask, how long did he study the problem?

Secretary DOUGLAS. Several months.

Mrs. GRIFFITHS. And what did he do? Where was he?

Secretary DOUGLAS. He covered the ranges, the test facilities, and did this, I would say, quite extensively.

Mrs. GRIFFITHS. Was he paid for this report?

Secretary DOUGLAS. No; he was not.

Mr. HOLIFIELD. He was on a w.o.c. basis, was he not?

Secretary DOUGLAS. I am quite sure that is so, Mr. Chairman.

NASA–DOD LIAISON

Mr. HOLIFIELD. Has Mr. Holaday's position been filled as head of the Civilian-Military Liaison Committee?

Secretary DOUGLAS. No. The Department, I think, has really assumed at this point that the proposed revisions to the statute establishing NASA would eliminate that committee and that office.

Mr. HOLIFIELD. Those are the amendment that have been submitted to the space committee, which have not yet been acted upon?

Secretary DOUGLAS. That is correct.

Mr. ROBACK. The testimony refers to an Activities Coordinating Board. Will that entail a legislative requirement, that is, to set up such a board?

Secretary DOUGLAS. It is our recommendation that it not be established by statute. We have outlined the character of the board and the scope of its activity, much as I have in my statement this morning, and are proceeding to establish it at the present time. It is certainly possible that a board similar to the one we are proposing to establish might be provided for, in the unit as such.

Mr. ROBACK. You want to wipe the slate clean as far as these committees created by statute are concerned, and have an administrative board set up to take over that area.

Secretary DOUGLAS. That is correct. And this grows out of the experience of the last year, to a large extent.

The liaison committee constituted really a new level with people that were concerned primarily with a liaison activity. So they really had to find out, themselves, programs and the things that each agency was doing and then try to come to come conclusion and make suggestions, with no authority under the statute.

We think that this is really putting an unnecessary layer in the machinery and that the way to accomplish this coordination is by a committee of authoritative acting managers of both agencies, and in this case Dr. York and Dr. Dryden will be the cochairmen of the Activities Coordinating Committee, and although the Committee, as such, will have no authority over Defense Department programs, or NASA programs, or Defense actions or NASA actions, the things that Dr. Dryden and Dr. York agree to can immediately be carried into effect because of their individual authority in each agency.

ADEQUACY OF LIAISON

Mr. HOLIFIELD. Now that sounds logical to me from the standpoint of their authority to make decisions, but do they have the time to do the work that a liaison man would do? In the Joint Committee on Atomic Energy we have had the Military Liaison Committee, of which General Loper is the head at the present time, which functions between the AEC and the Defense Department and our congressional committee.

Now that seems to work pretty well as far as the Joint Committee is concerned. I am not sure whether it has furnished an impediment or an assist to making decisions on the administrative level.

Secretary DOUGLAS. I think it has worked quite well, but I think the problem is quite different, because there you have the Defense

Department as the customer who is dependent upon the Atomic Energy Committee.

You do not have two activities that to some extent are parallel, are related, have mutual interest, where one is not dependent on the other, but it is necessary to provide good coordination.

I could respond further to that, but as to your question, does Mr. York have time to take that responsibility, he is the best witness. [Laughter.]

Mr. HOLIFIELD. I certainly concede that if the top men of three agencies are sitting around the table that they have the authority. But if there are conflicting interests in the three agencies, it may be such that they can't arrive at an agreement.

What happens then? Does it go to the Secretary of Defense?

Secretary DOUGLAS. Well, the Secretary and the Administrator would presumably try to work out a solution and, in the last analysis, any disagreements could be resolved, if they persisted, only by the President.

Now my observation is that I don't expect to have that type of disagreement. Dr. Glennan——

Mr. HOLIFIELD. The proof of the pudding is the answer to whether there has been that type of disagreement?

Secretary DOUGLAS. No; there has not.

Mr. HOLIFIELD. In other words, Dr. Glennan and Dr. York have always been able to resolve the questions between them?

Secretary DOUGLAS. Actually, Secretary Gates, myself, Dr. York, Dr. Glennan, Dr. Dryden, and Mr. Horner very frequently discuss current problems and, up to date, they don't seem to have provided any unusual obstacles to solution.

Mr. ROBACK. Mr. Chairman, Admiral Hayward told the House Space Committee that Mr. Holaday was given an impossible job and both agencies bypassed him.

Did they bypass him because they didn't want to cooperate or because his group was an inadequate contact agency?

Secretary DOUGLAS. Well, I am inclined to agree with the observation that it was a relatively impossible job. As I indicated, he was on the outside and had to serve both agencies usefully, and depended entirely on really the input from the agencies.

There were a few situations where the agency submitted problems for the liaison committee. I think what happened was that the agency continued to work with the Defense Department in a rather normal fashion that had been followed before very generally by the old NACA, and that was through coordinating working groups on particular projects.

Dr. York, would you like to respond to that?

Dr. YORK. That is essentially right. Also, this first year was a year in which all kinds of new and difficult questions were coming up, we were in a formative period, there were numerous cases where joint decisions by the Department of Defense and the NASA were needed. In order to arrive at a decision, certain information has to pass back and forth, and this is what is called liaison, this passing of information.

But since the principals, themselves, could get together and pass the information back and forth directly instead of through a third party, it was easier to do so more effectively and that is the way it was done. It was just the most practical means of doing business.

Mr. ROBACK. By having responsible spokesmen who had authority, you could have a more direct and facilitated interchange.

The chairman's concern is genuinely one based on experience that when you create a high level board, the members are too busy, and subordinates create a kind of liaison of their own, but they don't have any authority. Is that Activities Coordinating Board going to degenerate into one of those little boards?

Dr. YORK. I recognize the problem that you have in mind. But let me say that the Chairman of the Civilian Military Liaison Committee didn't have any authority and that the fact of life was that it ended up in our laps anyhow. Presumably it would under almost any kind of liaison system that you could invent.

The plan as Secretary Douglas has described it is to make up a board of whom the cochairman would be the Deputy Administrator and myself.

Mr. HOLIFIELD. Excuse me just a minute. I have got to go to another committee. I will be right back. Mrs. Griffiths, will you please take the Chair?

Mrs. GRIFFITHS. Yes.

Dr. YORK. Shall I continue with this answer?

Mr. HOLIFIELD. Yes, please. The record is important to us, and I will read it.

Dr. YORK. The plan is to have the Board consist of people who would be responsible for various subproblems, and the Board then meets only to take up the total situation and to resolve those things which aren't resolved at some other level.

Actually the desirable thing is to have these things resolved at the lowest level where it is possible to achieve agreement between the two organizations.

It has been done this way already but the proposal here with the Activities Coordinating Board is to formalize and regularize procedures which are now being used and have developed in a somewhat haphazard fashion.

Mr. ROBACK. Did this spring from the Operations Coordinating Board that is used with regard to other agencies? You know of that Board?

Dr. YORK. Yes.

Mr. ROBACK. Is this modeled on that Board?

Dr. YORK. No. Not as far as I know. If so, it is accidental.

POSITION OF ARPA DIRECTOR

Mr. ROBACK. Where does General Betts fit into the picture now, as contrasted with his position before? He was shifted from an autonomous agency within the Department of Defense to a level below your office?

Dr. YORK. General Betts is the Director of ARPA. The Director of ARPA prior to last December reported to the Secretary of Defense. But the Director of Defense Research and Engineering as the

Secretary of Defense's principal staff assistant with regard to research and engineering, had supervisory authority over the ARPA programs in a fashion similar to that over all other programs within the total Department of Defense.

It was decided in December by the Secretary that matters would be simplified if administratively, as well as from the point of view of technical supervision, the ARPA were put under the Director of Defense Research and Engineering and that is what was done.

General Betts now reports directly to me rather than directly to the Secretary of Defense.

SATURN PROJECT

Mrs. GRIFFITHS. I want to ask a question. Who composes the personnel of NASA?

Dr. YORK. By and large—of course, that is outside the Department of Defense. The bulk of the personnel of NASA are personnel taken over from the predecessor organization, NACA, the National Advisory Committee for Aeronautics, plus such people as they have—plus, as of this coming July 1, personnel from the Army Ballistic Missile Agency, plus such personnel as they have recruited separately since the formation, plus personnel that have been, I am not quite sure what the right word is, but supplied to them by the Department of Defense at their request.

Mrs. GRIFFITHS. Is this the organization that recently made the purchase of Saturn missile with competing bidders of Chrysler and Douglas?

Dr. YORK. Chrysler and Douglas on—there were more than that. The answer is yes, but there were more competitors than that.

Mrs. GRIFFITHS. This was the organization?

Dr. YORK. This was the organization.

Mrs. GRIFFITHS. Now, did they have complete control of this purchase?

Dr. YORK. Yes.

Mrs. GRIFFITHS. Who determined that they were to make the purchase?

Dr. YORK. The program, the Saturn program was assigned to them by an executive order of the President made in—I think it was October of last fall.

Mrs. GRIFFITHS. And the people who are now in the personnel had come originally from the Air Force?

Dr. YORK. No. Largely they came from the predecessor organization which was another non-Defense organization known as the National——

Mrs. GRIFFITHS. But they were advising actually the Air Force?

Dr. YORK. No. They have been an independent organization for the order of almost 50 years.

Mrs. GRIFFITHS. I see.

Dr. YORK. About that length of time. I am not quite sure when they were created. They are about 50 years old.

Secretary DOUGLAS. A long time.

Dr. YORK. They were known as NACA prior to the Space Act which changed their name to NASA.

Mrs. GRIFFITHS. Thank you.

SKYBOLT PROJECT

Mr. ROBACK. We asked for some information on British developments, and it is rather meager in your testimony, Mr. Secretary. I recognize much of it is outside the public domain, but there has been quite a discussion of the Skybolt.

Now, is the Skybolt a matter under your present supervision, Dr. York?

Dr. YORK. Yes. It is a research and engineering item and since all research and engineering comes under my supervision in defense, the Skybolt does, also.

Mr. ROBACK. The Skybolt, General White said, I believe, to the Appropriations Committee this year, "was way out in the blue." Also he gave a date, it was 1964. Is the Skybolt being developed as particularly tailored to the British requirements?

Dr. YORK. No. It is tailored primarily to our own requirements, but insofar as possible, and I might say it has been possible in every case so far, the British requirements have been taken into account. That is the problem of—the missile is being designed in such a way that it can fit on certain modern British aircraft, as well as on our own.

But it is based on an American requirement.

Mr. ROBACK. The requirement is for the B–52, I believe.

Dr. YORK. Yes, it is planned for the B–52.

Mr. ROBACK. Is the Skybolt really tied up to the idea of a nuclear aircraft?

Dr. YORK. No, in no way whatsoever.

Mr. ROBACK. This may not be a question within your immediate responsibility, but why would the Skybolt be a weapon which, by 1964, mounted on aircraft that are now in operation, would be preferable to various other kinds of weapons?

Dr. YORK. Well, it is another way of carrying out the strategic mission.

In 1964 we will, the United States will still have in very important numbers, B–52's, and therefore, these B–52's will form an important part of our strategic weapons system. The Skybolt is a means for extending the usefulness and increasing the usefulness of the B–52, beyond a time when it might otherwise become obsolete.

This is true because if one looks at the Skybolt in terms of being a penetration aid or a means of getting around the requirement for a B–52 itself to penetrate right up to a strongly defended target.

STATUS OF MANNED AIRCRAFT

Mr. ROBACK. All the emphasis seems to be on invulnerability and mobility, but the Skybolt is limited by the mobility of conventional or obsolescent aircraft?

Dr. YORK. That is right, but it has the interesting advantage—it has the advantage which aircraft have, which is still unquestioned, which is that you can get them off the ground into the air on warning which is about the most invulnerable situation you can have.

In other words, an aircraft can be launched on uncertain warning, whereas a missile cannot. And this gives aircraft an advantage and it gives any aircraft system such as the Skybolt the possible advantage.

Mr. ROBACK. Does it follow then that the aircraft, the manned aircraft, is a permanent part of the strategic defense system?

Dr. YORK. I don't think anyone can see far enough ahead to be certain, but I personally believe that we are going to have manned aircraft as a part of our strategic system for quite some time—for the foreseeable future, as far as I can see anyway.

Mrs. GRIFFITHS. Do you mean that the missile cannot be launched on uncertain warning, or it just can't be recalled?

Dr. YORK. No. The intercontinental ballistic missile cannot be launched as a practical matter on uncertain warning because it cannot be recalled.

Mrs. GRIFFITHS. Because it can't be recalled?

Dr. YORK. The aircraft can be launched on uncertain warning because it can be recalled.

DYNASOAR PROGRAM

Mr. ROBACK. Now, there has been a report, I believe in the press, that the Dynasoar program has been approved. Has it been approved?

Dr. YORK. The Dynasoar program seems to mean many things to different people. A Dynasoar program has been approved within the Air Force, yes.

Mr. ROBACK. Within the Air Force?

Dr. YORK. No, it has been approved by Defense, also, but it is an Air Force project.

Mr. ROBACK. Was that an approval by your office?

Dr. YORK. Yes.

Mr. ROBACK. And how much does the approval encompass?

Does it encompass the Dynasoar program that was presented by the Air Force?

Dr. YORK. It encompasses the first phase of that program. The program is divided up into several phases. The objective of the first phase is to build a glider, a rocket and glider system of such a nature that it is possible to explore the problems of reentry from orbital flight.

Now, not by actually orbiting in this first phase, but by approaching near-orbital conditions, meaning velocities of the order of mach 20, and altitudes of the order of several hundred thousand feet. It is an exploratory development.

Mr. ROBACK. How long was the Dynasoar program awaiting approval?

Dr. YORK. That depends—that is a difficult one to answer. From the time—it was a matter actually in this case of a relatively few days between when the Air Force finally determined precisely what it was it wanted to do in this phase 1 and when it was approved in my office.

Secretary DOUGLAS. I think we should it has been an active study program for several years.

Dr. YORK. It has been an active study program for several years and, of course, there have been proposals under that name existing since long before there were any rockets or any of the rest of the technology that could support the program anyway.

Mr. ROBACK. Mr. Secretary, when you were in the Air Force, was this a matter which was hanging fire for a protracted period?

Secretary DOUGLAS. I would say no. I would say that it moved in a rather normal fashion, as a project outside the present state of the art, an exploratory research project and it moved along with reasonable, orderly speed for the last several years.

I think when I say that, I ought to call attention to the fact that the X–15 is really a first step in the Dynasoar development, because there you have a mach 5 or 6 vehicle that explores some of the aerodynamic problems that you run into with Dynasoar that are much more difficult.

Mr. ROBACK. What commencement date do you assign to the Dynasoar project? Is there one that you can identify?

Dr. YORK. No, because that name has been used for over 10 years as far as I know as a name to describe possible boost glide vehicles which were in the form of gliders which sat on the front of boosters, but the various ideas about how to do this and various possible booster designs, glider designs, and so on have all been known by this same name.

So I would pin the origin of the present Dynasoar program, the one that is actually going at less than a year ago when it became finally—when finally we reached a point where there were boosters or there were boosters coming soon that were capable of being applied in this direction and the Air Force then proceeded with what they referred to as Phase Alpha, which was a study program to determine precisely what it is that could be done on the one hand and would be useful as a step in this direction on the other hand.

This has happened—I mean I could try and find out when the Air Rorce originated Phase Alpha, but it is less than a year back.

Mr. ROBACK. Did the glide technology in the early days have anything to do with the Atlas project which had a glide technology associated with it?

Dr. YORK. I am not sure I understand the question.

Secretary DOUGLAS. Don't you refer to Navajo?

Mr. ROBACK. No. My understanding, limited as it is about the Atlas, is that the contractor for a long time was trying to build an ICBM on a glide principle.

Dr. YORK. There have been ideas of this sort around, but none of them have been seriously pursued.

NIKE–ZEUS PROGRAM

Mr. ROBACK. What is the status of the Zeus program now, in the light of these competing ideas as to whether we ought to put money into production or preproduction? Is this a program that is going to be stretched out, cancelled, or accelerated?

Secretary DOUGLAS. Dr. York—— [Laughter.]

Secretary DOUGLAS. Well, I will be glad to answer that one.

The Zeus program is the Defense Department's major effort to produce an active defense against ballistic missiles. Although we are spending in ARPA something like $100 million a year to investigate all approaches to detection and active defense against ballistic missiles, the Nike-Zeus project that the Army is carrying out is the present directed effort to accomplish that purpose.

There is complete commitment to proceed with test hardware and to give a full testing to the Nike-Zeus system. There is no commitment at this time to go into production with the project.

Mr. ROBACK. Does the final decision as to whether this will be a weapons system hinge on these tests that are planned?

Secretary DOUGLAS. I am sorry, would you repeat that question?

Mr. ROBACK. Does the decision whether the Zeus will be a weapons system in being hinge upon the testing program?

Secretary DOUGLAS. I would say completely.

Mr. ROBACK. And does this testing program require nuclear explosions?

Secretary DOUGLAS. No; it does not.

Mr. ROBACK. So that this is not directly affected by the test ban considerations?

Secretary DOUGLAS. We don't think so.

Dr. YORK. Not directly.

On the other hand, if there were no test ban at some point nuclear explosives would be used as a logical part of this development program.

Mrs. GRIFFITHS. Who will make the final decision as to whether you continue or not?

Secretary DOUGLAS. The Secretary of Defense.

COST OF CIVIL DEFENSE VERSUS NIKE–ZEUS

Mr. ROBACK. Dr. York was persuaded to make the observation before the Appropriations Committee that a civil defense shelter program would probably save more lives than Nike-Zeus. Do you remember that, Dr. York?

Dr. YORK. Yes.

Mr. ROBACK. Was that a way of saying that you didn't think that the Nike-Zeus was the best investment relative to other possibilities?

Dr. YORK. Well, there have been studies that indicate that for comparable—and for comparable very large investments—that more lives can be saved in the face of a nuclear attack by a fallout shelter program than by an equal number of dollars worth of active defense system of the Zeus type.

Mr. ROBACK. According to the traditional categories of discussion in the defense field, you start with your strategic retaliatory force, you go to air defense, and you end up with that orphan known as civil defense.

Dr. YORK. That is not in the Defense Department.

Mr. ROBACK. I recognize that as a jurisdictional concept. But we are talking about the facts. Some people are concerned that the Department of Defense is indifferent, let us say, to considerations of civil defense. You have rejuvenated a thought here that I am sure the chairman will be interested in.

Are you suggesting that we should emphasize civil defense rather than missile defense?

Dr. YORK. I think we might very well look into both of them. I think the Secretary might prefer to answer what the Defense Department's view is.

SHELTERS FOR MILITARY HOUSING

Secretary DOUGLAS. The Defense Department has, of course, given consideration, as have the Joint Chiefs from time to time, to shelter programs. A shelter program can very well be considered to have an important possible contribution to make to our deterrent capability, because it may well be urged that it is only appropriate to make an affirmative effort to provide shelter and protection to population if we are considering engaging in a nuclear exchange, whether it is one we are driven into, as we contemplate we might sometime, by an attack or not. And the problem up to the present time, I think, has been that any significant shelter program adopted and directed would be fantastically expensive.

We feel that the present program of civil and defense mobilization, which is a program to encourage in various ways people to become acquainted with fallout problems and to provide their own shelter, is appropriate for the present time.

This raises questions as to whether the Defense Department in connection with military housing shouldn't make some provision for shelter construction because we have the people who live in houses that they never own, but that they occupy for short periods of time. This is the kind of problem that is receiving consideration.

Mrs. GRIFFITHS. On behalf of all of this committee, Mr. Secretary, I would like to thank you. We have spent years struggling with this problem of shelters and this is the first kind thing that has ever been said about it. I appreciate it.

Secretary DOUGLAS. I think we are sure to discuss increasingly the needs for shelter protection against fallout.

Mrs. GRIFFITHS. Wouldn't you think that one of the reasons is because recent studies have shown a faster rate of decay of fallout than had originally been anticipated? One of the things I think that people objected to was that they believed they were going to live forever, like moles, under the ground and they seemed to take the attitude that they would rather die. If they could stay under the ground 10 days and finally come out in some areas, it seems to me it gives a considerable impetus to the shelter program.

Secretary DOUGLAS. Yes; I think this is a factor, because under some circumstances, protection for a relatively short period of time would mean survival.

Mrs. GRIFFITHS. Yes.

BUDGET SUPPORT OF LARGE BOOSTERS

Mr. ROBACK. Mr. Secretary, the large boosters were transferred to the space agency. Now, aside from the consideration whether it was appropriate for the military to retain or relinquish jurisdiction, was that a matter of letting somebody else bear a big hunk of the budget?

Secretary DOUGLAS. Are you addressing the question to me?

Mr. ROBACK. Yes. I mean, was it convenient to transfer Saturn because somebody else would have to worry about the budget on it?

Secretary DOUGLAS. No. I don't think that that would give the correct impression, to answer yes to your question.

I do think, however, that looking at the whole problem of the exploration and investigation of space for scientific purposes, and its

utilization for peaceful purposes, we have to recognize that there is a real interest in doing things that the military departments see no urgent requirement for at the present time, that we want these things done and if we are to get them done, it seems to me much more appropriate that we charge another agency with the responsibility for doing them.

The military services might very well take on a number of the activities that are distinctly exploratory and investigative, but to have an understandable scientific peaceful utilization program for space, I am clear that one has to have an agency similar to the present NASA.

On the military side we don't look at our activities as constituting an overall space program.

We have developed and are prosecuting particular programs because we can do things that are necessary to the national defense better in space than we could do them any other way.

MILITARY REQUIREMENTS IN SPACE

Mr. ROBACK. The military requirement frequently is cited, its absence or its presence, for justifying the program. Obviously it is hard to say what the military requirement would be if you don't know too much about it or nobody is investigating it.

Dr. York has been quoted as saying that the moon has no military requirement attached as far as, let us say, a base for operations is concerned.

Now, is that a military or scientific judgment?

Dr. YORK. Well, it is a remark based on my experience, on my total past experience which is largely scientific, but I have been associated with military problems and military requirements for the last 10 years, also. It is mostly scientific. I don't know how to answer your question.

Mr. ROBACK. If some infantry major in the Army says that the moon might be an important base of ground operations, does that sound ridiculous?

Dr. YORK. It doesn't sound entirely plausible. [Laughter.]

Mr. ROBACK. Then, you see, you are passing judgment on what somebody might develop as a military requirement.

Dr. YORK. Well, I don't have any other alternative except to be quiet.

Mr. ROBACK. That is part of the dilemma of your job of approving or disapproving, isn't it?

Dr. YORK. Yes.

Secretary DOUGLAS. This also goes for the Secretary of Defense. The idea that civilians don't participate in or make military judgments is misleading; we can't avoid them.

MILITARY REQUIREMENTS FOR LARGE BOOSTERS

Mr. ROBACK. You appreciate, Mr. Secretary, that there are serious differences of opinion as to the military potential of space development. Certain people in the Air Force, like General Schriever and others, have very emphatically said that the military role in space is one that will be increasingly dominant.

The question that I asked about the budgetary consideration in the transfer of Saturn was related to this: Whether you are deemphasizing the role for the time being and then suddenly you will discover it is a very important role?

Secretary DOUGLAS. Well, one can't be sure that one will not discover an important role. It may very well be that a very large satellite requiring a large booster may have important military uses in the field of communications. We expect to become aware of requirements for larger space boosters, for military purposes when these new possible uses develop.

All we can say is that at the present time we see no urgent present need for space vehicles, for boosters, beyond the present boosters with certain modifications and the vehicles that those boosters will put in orbit.

Dr. YORK. May I add to that, Mr. Roback?

Mr. ROBACK. Sure.

Dr. YORK. The Department of Defense has repeatedly said that it has a very definite interest in these large boosters because of the fact that no one can predict what all of the possible—what all the possibilities are in the way of military space systems, military systems of any sort, I might add, in the distant future, and since boosters are one of the long leadtime items in any such systems, we feel very strongly that they must be—that large boosters of the Saturn class or bigger must be developed.

In other words, despite the fact that we say there is no well-defined or specific military requirement for boosters larger than the ICBM class, nevertheless, we go on to say we can't afford to foreclose on the possibility that there will be such a requirement.

Therefore, we strongly support the development of these big boosters. And while no one can say for sure what would be the case if things were different from what they really are, it is my guess that if there were no civil space agency, the Department of Defense would be carrying on a program of the Saturn type.

But there is simply no need for two Federal agencies to be doing—to be working in a duplicative fashion in this field of making bigger boosters.

And since the need for the civil space agency is clear, it is plausible that they should be the agency that carries out the program.

AIR FORCE ASSIGNMENT FOR SPACE BOOSTERS

Mr. ROBACK. In your assignment of space functions, the Air Force is responsible for boosters, space boosters, is that correct?

Dr. YORK. Yes.

Mr. ROBACK. Is that in effect a single manager for space lift?

Dr. YORK. It can be—I suppose it could be considered in those terms. The objective is to avoid unnecessary duplication in development of new big boosters for military purposes, to avoid unnecessary development or unnecessary duplication in arranging for the various people needed to operate boosters, design them, and so on. And it certainly is parallel with some of the single manager concepts, as I understand them.

NUCLEAR TEST DETECTION

Mr. ROBACK. Can you tell us anything about this research project that ARPA is responsible for with regard to nuclear test ban inspection techniques?

Dr. YORK. Yes. Would you like to hear from the Director of ARPA on that?

Mr. ROBACK. Yes.

General BETTS. As you are aware, Mr. Roback, the requirement in the ARPA VELA program is to learn all we can about the detection of nuclear tests. We have a great deal of experience related to the detection of tests in the atmosphere, since we have had an operational capability to do such detection for a long time. But there has been a growing feeling that if we came to some agreement with the Communists to the effect that we would discontinue testing, that they could either project their tests far out into space or do them underground and we would not be able to detect this violation of the agreement.

If you will recall in connection with the discussions in Geneva, there were certain detection systems proposed. These detection systems were not 100 percent perfect as proposed. The net result of that fact is that a mission was given to ARPA to carry on research and development to see if we could not learn more about the ability to detect either underground or out in space and do what is necessary to improve our capability in this area.

Mrs. GRIFFITHS. If you can't detect the explosion, is the fallout, then, harmful to life?

General BETTS. If you can't detect it?

Mrs. GRIFFITHS. If you cannot detect it.

General BETTS. If it is so far out in the atmosphere that you can't detect it, there would be no significant fallout on the earth.

Mrs. GRIFFITHS. If it is underground, is there any harm?

General BETTS. Very little, except perhaps from the very long term leaking of radioactive materials into subsurface water. I doubt that there is any significant amount of harm from the deep underground tests.

Mrs. GRIFFITHS. Thank you.

ARPA ROLE IN TEST DETECTION

Mr. ROBACK. Do you see a conflict in responsibilities here between ARPA, as a military agency, and an agency for investigating detection techniques? I preface that by saying that many people are concerned that the Atomic Energy Commission, which is responsible for promoting weapon and reactor work, is less inclined to be concerned about radiation health hazards, let us say.

Some people feel these are conflicting interests and that another agency should be responsible for the health hazard control.

And some people, analogously, have suggested we ought to have a peace agency to investigate, perhaps with laboratory facilities, this type of problem. Is this a fit job for the Defense Department, to investigate the disarmament aspect, if I may put it that way?

General BETTS. I think in some measure the decision had to be arbitrary as to where this mission was assigned, but in view of the

fact that a considerable part of the proposed program would be related to satellite experiments and a considerable part had to do with seismic work, since there was some capability along those lines already existing in the Department of Defense, it was not illogical that it be there assigned.

Actually we have a very close working relationship with Atomic Energy Commission, with the U.S. Coast & Geodetic Survey, because of their worldwide interest in seismology, generally, and with the National Aeronautics and Space Agency, who will do some of the experiments with respect to the background radiations which are part of the VELA program.

So that while it was arbitrary, I think that the largest part of the effort will end up by being analogous to defense programs.

Secretary DOUGLAS. I would like to say that I think there is no serious conflict, that these tasks given to ARPA are given because of a competence that already exists and that one can expect of ARPA a wholly professional approach to the problems that are given to it.

Mr. ROBACK. Who directed the placement of this contract, if it is a contract? Or this project?

Dr. YORK. It is not a contract.

General BETTS. It is not.

Dr. YORK. There were agreements reached over a year ago between Dr. Killian, Dr. Quarles, and Mr. McCone, which set the basis for the present scheme of doing things.

Mr. ROBACK. Was there consideration that the AEC might have done it, but they might be considered partisan?

Dr. YORK. No. The basic consideration was simply where the talent lay for the particular things that needed to be done.

TRANSFER OF PROJECTS FROM ARPA TO SERVICES

Mr. ROBACK. In the reassignment of ARPA projects to the services, did you have in mind some of the strictures or observations that were made in this committee's report, Mr. Secretary? Are you familiar with the committee's report?

Secretary DOUGLAS. With respect to——

Mr. ROBACK. With respect to the problem that ARPA would have in holding onto projects for which the military had the——

Secretary DOUGLAS. The operating responsibility?

Mr. ROBACK. Yes.

Secretary DOUGLAS. Yes, I think the observations in the report were well justified and I think the reason, as I have indicated before, for giving ARPA responsibility for satellites, when the responsibility was originally given to ARPA, was to slow down a perfectly natural competition for projects between the services at that time and see that the projects undertaken provided a coherent approach to the military problems.

Now, having accomplished that step, I think it has become increasingly clear that it would be desirable to assign the projects out of ARPA to the principal interest agency and the service that would make use of the particular projects.

ARPA FUNCTION IN UTILIZING TRI-SERVICE INTERESTS

Mr. ROBACK. Do you want to say something, General Betts?

General BETTS. Well, I would say that the success of the programs that we have turned over to the military departments, particularly the SAMOS and Discoverer programs, are witness to the fact that we did put together programs that did use the capabilities of the several services and kept the several services interested in each others' programs without being competitive.

For example, the outstanding case at issue is the Transit program. The Army people have very considerable responsibilities for and interest in mapping, which will have to do with the greater accuracy possible from a navigational satellite.

The Navy, of course, had it as a primary interest in terms of ocean navigation, and the Air Force had the capability to put it up there.

I am personally convinced that if it had been given 2 years ago as a mission to any one of the single services unilaterally, the interests of the other two services would not have received the same impartial attention as they did receive under the ARPA mechanism.

Mr. ROBACK. Does this reflect a somewhat different emphasis or concept, namely that in the beginning ARPA might have been a repository for projects which the services might fight over, whereas now ARPA is, in a sense, a kind of assistant, perhaps, a helper to the services, rather than a competitor?

General BETTS. I think that misses the point of ARPA. I think the point of ARPA is that progressively as technology is outpacing the traditional divisions among the services, we need a mechanism within the Office of the Secretary of Defense which can use the maximum capabilities of the three services on a program of interest to all of them, and if it is put unilaterally within any one of the services, it just does not work out that way.

This is carried out in the Reorganization Act of 1958. If one forgets ARPA completely, the words are in there that the Director of Research and Engineering shall have this kind of authority.

Mr. ROBACK. There was a time when the Air Force or certain people in the Air Force regarded ARPA as a competitor in the sense that it had potential as a space agency, perhaps, which the Air Force was interested in taking on.

Has that feeling pretty well died down?

General BETTS. I think that was killed by the September 1959 decision to show where the space missions would fall. Isn't that right?

Secretary DOUGLAS. I think perhaps the feeling naturally existed to some extent because several of the projects were quite well advanced at the time ARPA was given full responsibility for them.

General BETTS. That is right.

Secretary DOUGLAS. I also think that ARPA did accomplish an immensely useful purpose, just as General Betts indicates, in bringing together the available talent and capabilities of the several services to accomplish the particular projects.

CENTRAL CATALOG OF SATELLITES

Mr. ROBACK. In trying to divide up the labor, not only among the services, but between the space agencies, civilian and military, I note that ARPA is responsible for a central catalog of satellites.

Offhand, why shouldn't that be a NASA responsibility?

General BETTS. I think it ultimately will be a NASA responsibility, but at the time that that responsibility was assigned to ARPA, it was not being done anywhere. The military was probably the one primarily interested from a defense point of view, witness the reaction to the Discoverer V piece which we labeled "UNK 1," until we finally found out what it was. ARPA will get rid of this responsibility and turn it over to the appropriate agency.

I can't predict exactly how this will happen, but I would expect that the elements of this cataloging problem which are of interest to the scientific community will ultimately come to rest in NASA, at least in a cooperative way with the defense requirements for the same thing.

Secretary DOUGLAS. Those are the projects that were mentioned in my statement with respect to which I gave no indication as to the final solution and no solution has really been arrived at, yet.

ANTIMISSILE DEFENSE

Mr. ROBACK. What can you tell us, Mr. Secretary, about the antimissile defense developments, other than Zeus, that we were talking about?

Secretary DOUGLAS. I would hesitate to try to outline the areas of exploration at the present time because I have not been close enough to them to be clear as to the classification of the information.

Mr. ROBACK. General Betts, are you in a position to—do you have responsibility generally over the antimissile work?

General BETTS. The Defender program in ARPA is a program designed to extend our state of knowledge in the whole field of ballistic missile defense.

When ARPA was first set up, it was conceived that the entire ballistic missile defense program would be turned over to ARPA, but at that time it was perfectly clear that the definition of the Nike-Zeus system had advanced to the point where it was more appropriately carried out within one of the military services, very much along the lines of the way programs have since been released from ARPA to the military services.

Now, if in the development of the Nike-Zeus program, it becomes apparent to either people in that program or, more likely, to people outside of the program, that some completely different approach might have some payoff, it seems that the developer of the Nike-Zeus is faced with two problems: One, does he abandon everything he has accomplished? Or does he divert from among his development talent some people to go off on this different approach?

I think the point to the ARPA being in the Defender program is that we can work hand in glove with the Nike-Zeus development team, and in assessing those things in technology which ought to be pressed forward, which may have to do with Nike-Zeus improvements or may not, we can be very independent of the development, as such.

MANY APPROACHES IN DEFENDER PROGRAM

And since we are not too involved with the Nike-Zeus approach to the problem, I think we are in a position to bring to bear on this very difficult effort a complete national attention to the problem.

Witness the fact that in the ARPA Defender program we have at least a couple of hundred different contract efforts that are directed toward this solution.

Now, some of them are very small, some of them are university-type things in reentry physics or collision cross sections, trying to learn something about what happens up there in the fringes of what we call the sensible atmosphere.

But others are very close to hardware. For example, the Tradex radar is a rather conventional tracking radar, it will be very big and very powerful. With it we will be able to see farther along the trajectory of an incoming missile than will any of the Nike-Zeus radars, for example.

What I am saying is that ARPA is trying to pick up where Nike-Zeus leaves off and stay out ahead of it in terms of technology.

If we discover something in connection with kill mechanisms, in connection with radar, in connection with discrimination, which is applicable to Nike-Zeus, all well and good.

We have very frequent data interchange with the people on the Nike-Zeus system. If we come up with something that is completely different, as an approach to the defense against ballistic missiles, then we can pursue this without being another service in direct competition with the Army program, I think we can tend to be more objective about the whole thing.

OFFICE OF DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

Mr. ROBACK. Dr. York, can you tell us a little bit about the organization of your office and some observations about your experience, having been in office for several years, I believe?

Dr. YORK. Sixteen months, Mr. Roback. [Laughter.]

Well, the office consists of a staff which has the assignment of reviewing the service programs and then it also consists of ARPA.

Let me, since we have been talking about ARPA a little bit, let me talk about the part of the office exclusive of ARPA.

This office is based on an office which I inherited from my predecessor who was the Assistant Secretary of Defense for Research and Engineering.

There are in it something like 100 technical people altogether. Again I am exclusive of ARPA now. These 100 technical people are organized into two kinds of offices. One group of offices headed up by office directors which reviews programs from the point of view of technical content, deals mostly with applied research and things of that sort.

These are offices in electronics, aeronautics, fuels, materials, ordnance, other fields defined by the name of one or another kind of technology.

In addition, we have some new offices. There are a group of Assistant Directors who deal with things from the point of view of the objective as opposed to the point of view of the technology. These deal with fields of air defense, strategic weapons, tactical weapons systems, communications and so on.

And then in addition to these offices, there is ARPA. I don't know quite what you would like to get at, Mr. Roback.

Mr. ROBACK. Well, do you try to set up the structure of your office to parallel or cover functions in the services?

Dr. YORK. No, largely they cover—no, they are divided. The various tasks of people working with me are divided up in a different way. The Air Defense Office, for instance, covers all matters related to air defense, whatever service they may be in.

Largely at the present time this means Army and Air Force, but under the purview of that office comes Zeus, Bomarc, SAGE, Hercules, so on.

In the case of strategic weapons, this office deals largely with Air Force, but not entirely. We have the B–70, Atlas, Titan, also the Polaris comes under that office.

One of my offices does deal with just one service. I have one office set up specifically for sea warfare, largely dealing actively with undersea warfare, the antisubmarine warfare problem, things of that sort.

The technical office for electronics is concerned with electronics wherever it is done and for whatever purpose.

So the office is not organized according to service missions but according to, on the one hand, end objectives and according to fields of technology on the other hand.

Mr. ROBACK. Can you give us any observations based upon your 16 months in office about the functions—let's say the nature and problems of your office?

Have you gotten along better or worse than you expected and what do you have to do in the future?

Dr. YORK. I have gotten along about the same as I expected, I might say. [Laughter.]

We have a very good working relationship with the services, in particular, of course, with the R. & D. parts of the services.

I meet regularly with the assistant secretaries of each of the services for R. & D., including under that general heading the Director of Research and Development in the Army, who is not an assistant secretary, legally, and meet also regularly, although perhaps somewhat less often, with the military chiefs of R. & D. for each of the services.

On occasion when circumstances demand it, I also meet with the Joint Chiefs on some particular problem that involves—that would necessarily involve their responsibility.

Mr. ROBACK. It was contemplated in the Reorganization Act of 1958, which graced your office with a statutory mandate, that it would be one of the most important offices in the Defense Department. In fact, because you deal with development work and all weapons systems today are development problems, basically, you have probably one of the most important responsibilities in the whole national defense effort.

Secretary DOUGLAS. I can assure you that the expectation has been realized. That he is one of the most important people in the Defense Department.

Mr. ROBACK. You are giving him an excellent credit rating.

Secretary DOUGLAS. And I will give him an excellent credit rating.

Mr. HOLIFIELD. I have known Dr. York in his work for many years in the atomic energy field, and I would like to add my commendation to the type work that he did before he came to this particular job, and I am sure he has shouldered his responsibilities here in a meritorious manner, too.

BUDGET VERSUS TECHNICAL DECISIONS

Mr. ROBACK. I would like to ask, Mr. Chairman, whether Dr. York considers himself an administrator or a scientist in discharging these responsibilities? I know the line can't be easily drawn, but are you an administrator and a budget man now, rather than a scientist?

Dr. YORK. I don't think there is much question but what the job is basically one of helping the Secretary of Defense to administer the research and development programs in the Defense Establishment.

But it helps a great deal in doing that to have a technical understanding of what is going on. So that I guess it is most nearly correct to say that I try and do both at the present time.

Mr. HOLIFIELD. In other words, your scientific background gives you a peculiar attribute of judgment to perform your administration tasks?

Secretary DOUGLAS Judgment, scientific technical competence is essential to perform the particular tasks.

Mr. HOLIFIELD. In his particular job of research and development.

W.O.C. EMPLOYEES

Mr. ROBACK. Because Dr. York is here today, Mr. Chairman, I would like to ask him to advise us on a problem that we are going to discuss later in the week.

What type of problem are you confronted with when you want to hire somebody and he won't work unless he keeps the salary of his company? What type of problem are you confronted with and what do you do about it?

Dr. YORK. Well, I have found it necessary, in my opinion, to add to the staff, add to the permanent staff which I inherited, some additional people who have had more recent experience with problems at the—who have had more recent experience in working directly on technical problems, as opposed to experience in supervising from the Government point of view.

I might hasten to add that it is necessary to have both, it is necessary to have both kinds of people and both points of view. But I have sought to add a relatively small number, altogether about 8 or 10 people, to the preexisting staff and these people I have recruited from various sources, some from within Government laboratories, some from universities. and some from other kinds of nonprofit institutions, some from industry, wherever it seemed that we could get the man that we needed for the particular job.

A few of these, in a few cases it has been necessary for one reason or another, to use the "without compensation" approach which is allowed in Public Law 704, if I have the name right.

This has been used only in a minority of cases, but where we have used it, we have felt both the ned for using it and that we were justified in using it, that we were within the spirit of what was meant.

Mr. ROBACK. Well, Dr. Critchfield was one of those. Was he designated by you? Was he recommended by you? There is nothing invidious in this question.

Dr. YORK. Yes.

Mr. ROBACK. We are trying to find out why someone is entitled to work for the Government and keep his pay and somebody else isn't. That is the point.

Dr. YORK. Well, at the time Dr. Critchfield was asked to become the Director of ARPA, ARPA was not—did not administratively report to me; that is the Director of ARPA did not.

However, the Secretary of Defense, Mr. McElroy, did discuss all of the various—a number of various possible candidates with me, did seek my approval or disapproval of the candidates.

I did approve of Dr. Critchfield and would like to have seen him come to work for Defense.

Mr. ROBACK. We thought maybe he got scared out too easily. He heard Mr. Holifield had asked a question about this matter and he just got scared out. Now, has anybody else gotten scared out? Was Dr. Skifter scared out?

Dr. YORK. No; Dr. Skifter is one of the people who was in my organization on a without-compensation basis. He had spent a number of years, working most of his time for the Government, the last year full time, and for personal reasons, he felt it necessary to leave and, in fact, when he originally accepted the job a year ago, he did it with the firm understanding at that time it would be for only 1 year. I don't think he was influenced in any way by anything that went on with respect to the other people in the WOC category. With respect to Dr. Critchfield, I can't speak for him. We did not withdraw—we did not withdraw the offer to him.

Mr. HOLIFIELD. I would like the record to show that I have never met Dr. Critchfield, and from what I have heard of him, he is a man of very fine attainments and fine character, and my opposition at that time was not based on personality of any kind. It was based on the principle that was involved, and my knowledge of the background of the legislation. This was a rider on an appropriation bill for the purpose of providing a certain number of experts on a consultative and advisory basis and really not on an administrative basis.

In this particular instance, ARPA had charge of the allocation of contracts in defense industries to the extent of about $500 million, I believe, the previous year. It was, of course, facing a reduced program, but there were still contracts to be allocated.

Dr. Critchfield was a paid employee of a defense firm with tremendous Government contracts. He sought, under the terms of employment that were offered him, he sought to maintain his financial compensation from his company and at the same time serve the Government in an administrative capacity.

The result in such a case might well be detrimental to the Government even though Dr. Critchfield had tried, and I am sure would have tried, to have done just as objective a job as possible.

If a contract came up which should, on its merits, have been awarded to the Convair Division of General Dynamics, he might have been loath to have awarded that contract for fear of criticism. If he had awarded it on its merit, the competitors who sought that contract would certainly charge that he was prejudiced because of his employment and his continued financial obligation to the company.

On the other hand, if he bent over backwards and gave it to a company less qualified to perform the contract, it would be to the detriment of the United States, although he might absolve himself from criticism in that instance.

I think no man in public life should be placed in that position.

Dr. YORK. None of the other WOC personnel are directly involved with contracts. There was a difference—there was the difference that you point out, Mr. Chairman.

Secretary DOUGLAS. Mr. Chairman, I think when you use the words "he might award a contract"——

Mr. HOLIFIELD. Well, "recommend."

Secretary DOUGLAS. You really meant he might participate in advice that might result in the award, because clearly under present statutes, he couldn't obtain an immediate part in the contracting with a firm in which he had an interest, which he would have if he was still on the payroll.

Mr. HOLIFIELD. That is true. But these things are not as black and white——

Secretary DOUGLAS. That is correct.

Mr. HOLIFIELD. Or as clearly defined as we would like. If he should stand aside in a particular instance and deny the contracting board his acquiescence or his advice on a subject of this kind, here again——

Secretary DOUGLAS. There can still be appearances.

Mr. HOLIFIELD. He would be failing to do his complete duty in the job that he was handling. And he would probably rightly disqualify himself, but in that very instance he would not be fulfilling the complete obligations that a man should be able to fulfill if he is placed in that type of an administrative position.

FUTURE USE OF STAFF OF INSTITUTE FOR DEFENSE ANALYSES

Mr. ROBACK. I would like to inquire whether the problem of ARPA is now the problem of the directorate? Or is that a special problem because you have retained the technical staff under contract in ARPA? Does that relationship still stand?

Dr. YORK. It stands as of today. You are referring to the relationship between ARPA and IDA?

Mr. ROBACK. Right, yes.

Dr. YORK. It still stands, but it is changing. ARPA has built up more and more of a competence on the Government side of the house and has reached the point where we are now in the process of working out with the Institute for Defense Analyses a new arrangement whereby they will primarily provide assistance to my office as a whole, rather than just to ARPA, and the form of this assistance will be more in the nature of scientific analysis of information and editing information for the purpose of giving us certain advice with respect to what needs to be done in a general way and so on.

Mr. ROBACK. I wonder if you have any observations on this point, and it is rather a refined issue. It has to do with the type of contract services that are performed by such agencies.

In the Air Force there are certain people who believe that if you don't have line responsibilities and reach down into a contractor's plant, you are not too effective, you are too ivory-towerish, you are too aloof from the problem, even though you have to advise on hardware, you don't know enough about it.

Other people believe if you get too close to the contractor you get the kind of problems that the Air Force has run into with some of its contract relationships. How is IDA in that regard, how do you judge its service?

Dr. YORK. Well, IDA has been extremely helpful. I would go further than that and say that it has been essential in its role of assisting ARPA but that is in part due to the newness of ARPA and the need for getting something going rather quickly.

And as I said earlier, we are right now trying to work out a phased change in this relationship. The Air Force has both groups which deal directly with hardware and with contracts, and it also has groups like Rand which do work more of an analytical nature, which provides the Air Force with general advice, in which direction to go, not directly with hardware, but with the more general problems of what kind of strategic systems look best and so on.

I don't know whether I am getting at the heart of your question or not.

Mr. ROBACK. Well, I asked for an observation, and I believe you have made it.

USE OF JUPITER AND THOR

What has happened to the Jupiter, Mr. Secretary? We always suspected that the Air Force had no use for it. Apparently it disappeared from the scene. What has happened to it?

Secretary DOUGLAS. Jupiter is still being produced at a very low rate, to provide the operational missiles and test missiles over a period of time, that are required for the two squadrons to be deployed.

Mr. ROBACK. Are they still to be deployed?

Secretary DOUGLAS. Yes, sir.

Mr. ROBACK. There is no change in that?

Secretary DOUGLAS. No change in that at all.

Mr. ROBACK. And there is no change in the countries to be negotiated with?

Secretary DOUGLAS. No change. I said two squadrons. Three squadrons are involved.

Mr. ROBACK. Three squadrons.

Mr. RIEHLMAN. Was the original plan for four squadrons, to start with? I have that figure in mind.

Secretary DOUGLAS. The last plan according to my recollection, was that there were to be five squadrons of Thor and three squadrons of Jupiter and one of the Thor squadrons was eliminated.

Mr. RIEHLMAN. That is probably where I got the four figure.

Secretary DOUGLAS. So it leaves the program at four and three.

Mr. RIEHLMAN. And three.

Secretary DOUGLAS. We might have had more squadrons had we more enthusiastic customers for this particular type of weapons system.

Mr. HOLIFIELD. There has been a change in the number of missiles to the squadrons, has there?

Secretary DOUGLAS. No, there has not. They still both have 15 missiles to the squadron.

SOLID-PROPELLANT RESEARCH

Mr. ROBACK. General Betts, what is the status of the solid propellant research? Do you have any report to give us on that?

General BETTS. The solid propellant program is so close to basic research that the only kind of report I could give you is that we

have many different contractors working on different elements of the problems of synthesis, or searching for new compounds which might contribute.

But aside from pulling this information together in symposia, discussing where we should push the research and where we should discontinue on unprofitable programs, I couldn't say any more than that we have had a feeling that a 20 percent increase in the specific impulse of solid propellants is certainly within reach, within the next couple of years.

In other words, we feel that we have made significant progress with respect to certain compounds, but we haven't reached the point yet where we are building pilot plants and ready to fill missiles with them.

Mr. HOLIFIELD. And until you do have that success, there will be a limited range on your Minuteman and your Polaris?

General BETTS. There are some things that can be done in what I would call a product improvement way with respect to current missiles. Those things are being done, properly, by the services concerned with those missiles. The ARPA program is out beyond that, in a much more fundamental approach to the problem.

What we will do won't contribute to hardware for probably another 3 years.

MOBILE MINUTEMAN CONCEPT

Mr. ROBACK. Mr. Secretary, there was quite a deal of controversy, some of which was noted in our report, about concepts of mobility between the Army and the Air Force, when you were building the Thor and Jupiter. The Air Force was inclined to be stationary, the Army was inclined to be movable or mobile; now the Air Force has come around in the Minuteman to a position which seems to be pretty much what the Army position was. Reporter John G. Norris has an article in the Washington Post today, which includes these paragraphs, "Meanwhile, the Air Force announced today that it will start testing the feasibility of its mobile Minuteman ICBM next month on railroad trains roving over the Western States.

> Joint Strategic Air Command-Army crews, assisted by railroad experts, will test the effectiveness of planned communications and control systems for the radical concept of mounting 6,300-mile nuclear-headed missiles on railroad flatcars.

This is SAC on flatcars. Would you tell us a little bit about the future of the Air Force?

Secretary DOUGLAS. Flatcars may materially affect the future of the Air Force, may have an important part in Air Force operations.

I think it is important when we deal with this problem of mobility at all to go back and try to recreate people's thinking that existed at the time the IRBM's were under development. I think it is perfectly true to say that the Air Force approach to the ground environment and tactics of the Thor was affected by the Air Force's familiarity with fixed air bases.

Their first inclination was to say, "Here is another airbase problem. We will create launchers." At that time there was more interest in a short reaction time than there was in hardening or protecting the missile system. I think it is true that the Army at that time, with respect to the Jupiter, approached the Jupiter from an ar-

tillery standpoint and wanted to create a system that was reasonably mobile.

The difficulty there was that the big liquid missiles, whether ICBM's or IRBM's, do not lend themselves very well to what one could call mobility.

You can make them movable, but I would say that the plan to make those missiles really mobile has been impractical.

Now, the next development in the thinking on the big missiles was the conviction that hardened sites would provide the sure protection for that part of our retaliatory force, and this is certainly so, in my opinion, for the foreseeable future, or for a number of years.

But we have also become well aware of the fact that the possible accuracy of long-range missile systems makes fixed sites, even though somewhat hardened, less invulnerable than was originally anticipated. And it is this fact that has given an increased interest to the real mobility that can be accomplished with a system like Minuteman which, in its size permits a movable environment such as flatcars and a train that has all the ground environment and launch controls in it.

Mr. HOLIFIELD. Mr. Secretary, I am glad you are thinking along this line. This committee and other committees I am a member of, have thought a great deal about this problem of making a hardened base an attractive target for multimegatons in order to destroy it, and the secondary effect of which would be to destroy the people downwind from it, if it were ever attacked.

I am somewhat alarmed at some of the thinking that has been going on in regard to this factor. We had testimony before our committee from General LeMay, in which he indicated that a hardened base might take as much as 60 megatons to destroy, where a one megaton weapon would destroy a soft base in the same location.

If this be true, then the strategy of your hardened bases carry an inherent danger to the population downwind for many thousands of square miles; that is, the adoption of the primary strategy has an inherent secondary effect upon the population which nullifies the purpose of the first, if it ever has to be used.

HARDENED BASE CONCEPT

Secretary DOUGLAS. Well, there are a couple of things I would like to say in response to those observations.

First, I want to make it clear that I have confidence in the appropriateness of a hardened base system in the years immediately ahead and I have been concerned about some tendency, perhaps, to too much downgrade hardened fixed sites. We have to recognize that as soon as you have a fixed site that is hardened to the point of withstanding 100 pounds overpressure, it will take a very considerable number of big warhead missiles to destroy such a site, except with practically a direct hit.

So I am not concerned about the appropriateness of our present planning, or the tremendously important part the hardened Atlas and Titan sites will play in providing the retaliatory capability before we have Minuteman.

Now, of course, we also have a very fine system coming into effect in Polaris where concealment is the major key to its invulnerability.

Now, as to your observation that it will take many megatons to destroy the fixed hardened site—and I think this is true—this raises a question as to fallout and danger to population, I think this also is true. I think it suggests the desirability, when practical, or locating those missile sites in areas of rather less population than more population, although we will certainly locate missile sites in areas where you have fairly heavily populated localities.

I think this is probably inevitable.

Mr. HOLIFIELD. You can't do it inside the United States.

Secretary DOUGLAS. I think that is right, sir. Now, the alternative that is suggested sometimes and I have listened to it with interest in the years past, of putting the missile systems outside the United States certainly has attractions if they can be constructed and surely controlled and protected.

Actually, it is much more difficult to find areas outside where they could be protected and where we could be absolutely assured of their availability.

I can't help but have the feeling that if these striking weapons were outside the country, you still have their support within the country, and if a possible aggressor ever decided it might be profitable to attack with nuclear weapons the United States, that aggressor will certainly attack our Government control centers, our military communications centers, and our whole country, not be just concerned with weapons systems that were not close to population centers.

DETERRENCE CONCEPT

Mr. ROBACK. Is there a Department of Defense theory of deterrence, Mr. Secretary? You know many people have theories of deterrence and the services have differences about them, about what is required and what is involved.

Is there a Department of Defense theory of deterrence that is followed?

Secretary DOUGLAS. Well, perhaps it is natural to over-simplify, to start with, and say that our strategy of deterrence is simply the strategy of remaining so strong that no possible aggressor could see profit in aggression against us, or against our allies.

Now, certainly there are two kinds of attack that we are interested in deterring. One is against us, and one is against our allies.

With respect to the attack against us, clearly SAC and the missile forces, including Polaris, that are coming in, are our principal deterrent force.

With respect to the attacks against our allies, the problem of limited wars in some instances becomes a problem and there we have the question of a deterrent against such attacks as might be launched against them.

Whatever the character of the attacks we have to maintain the clear will and intention to respond or our deterrent capability will become ineffective.

Now, as to deterring small wars by having the ability to contain them or defeat the aggressor in small wars, really all our military forces are available and appropriate, with the exception, perhaps, of SAC and our air defense capability.

So I think it is important to recognize a large force and strength for the deterrence of small wars as well as for the deterrence of the nuclear attack.

CIVIL DEFENSE SHELTERS

Mr. HOLIFIELD. Mr. Secretary, you spoke of the importance of the "will" to use the weapons. It causes me, as chairman of the committee that has studied the problem of civil defense in the United States for 4 to 5 years, and Mr. Riehlman here has been on the committee that long and longer, to ask you why it is that the Defense Department, which has the most knowledge of the terrible destruction that can be wreaked by nuclear weapons, does not have an active interest in the civil defense of the population that it is supposed to protect?

Why is it that they have not taken into consideration the factor of radioactivity on the population which an exchange of nuclear weapons would occasion, and advocated a protection of the population in the best manner that is known, in order that that will to use the weapons and the will to protect our psychological position in using them is fortified?

Secretary DOUGLAS. Mr. Chairman, I think while you were out of the room, I made some observations on just this subject.

Mr. HOLIFIELD. I am sorry.

Secretary DOUGLAS. And I am glad to comment again. I am perfectly clear that a shelter program can play an important part in our deterrent posture. I think that we are moving closer to more active steps to secure shelter from fallout. Up to the present time I am sure that in the military it seemed much more important to develop offensive power than passive defense. My view is that at the present time we are learning a good deal about shelter problems, the public attitude toward shelters in the program of civil and defense mobilization, to encourage shelter construction on the initiative of the people, themselves.

Mr. HOLIFIELD. It is not working, Mr. Secretary.

Secretary DOUGLAS. The extent to which this can be done is not at all clear.

Mr. HOLIFIELD. It is not working. You can't depend on that any more than you can depend on the people to build your Minuteman. It has got to be done.

SHELTER FOR MILITARY HOUSING

Secretary DOUGLAS. I would still like to see, myself, see further efforts to create incentives toward shelter construction. At the present time the Defense Department is giving consideration to the construction of shelters in new housing to be built and to the possibility of supporting shelter construction in existing housing.

Mr. RIEHLMAN. That is for the military personnel?

Secretary DOUGLAS. That is correct.

I think, I might say, that that is not treating military, as I see it, in a special way at all. It is merely recognizing that the national policy is to encourage shelter provision and that in the case of the military, where they live for 2 or 3 years in houses that are provided, instead of in houses that they own, that they can't be expected to take the initiative, themselves, I think we have to give consideration to

playing a part that puts them on an equal footing with the rest of the civil population.

Mr. HOLIFIELD. Well, they will be far ahead of the rest of the population if this program is adopted—and I commend you for recognizing this program for military housing. But the high majority, I would say 95 percent of the military people do not live in military housing and the dependents of the members of the armed services live in ordinary housing just like the rest of us live in.

So you are very timidly sticking your toe in the water, but you are not advocating, as I think the Defense Department should, because of its knowledge of the effects of these weapons, strong national recognition of this problem. You might well say that that is the function of the civilian part of the Government. At the same time, if the military adopts a strategy the primary effect of which is to deter war, but the secondary effect, if deterrence fails, is to foredoom the population to destruction, then it becomes the military's responsibility for the strategy that they have adopted.

Secretary DOUGLAS. Well, the chairman is as aware as I am of extraordinarily varied views on this subject. This is so in the Defense Department; this is so among all the people with whom I discuss the subject.

I am sure that the need for shelter programs will receive increasing consideration in the months ahead.

ROLE OF CIVIL DEFENSE IN DETERRENCE

Mr. ROBACK. Would it be appropriate, Mr. Secretary, to direct ARPA to prepare a study on the civil defense role in the discharge of military responsibilities? That is, civil defense requirements?

Secretary DOUGLAS. I would hesitate to say that that would be appropriate, because I think that the Office of Civil and Defense Mobilization has that clear responsibility.

Mr. ROBACK. You misunderstand the point.

Secretary DOUGLAS. I am sorry.

Mr. ROBACK. In other words, what is the role of civil defense in deterrence? In carrying out your military responsibilities, what is required in a civil defense way? This is not the OCDM responsibility, directly.

Secretary DOUGLAS. Well, questions have been addressed to the Joint Chiefs of Staff, both with respect to the use of military forces in civil defense functions and also with respect to a Defense Department policy on shelters concerning military personnel.

Now, these things are getting consideration at the present time.

Mr. ROBACK. We have received a statement about that. But there is a more sophisticated concern than building shelters in military housing or in connection with control centers. This is a question of the role of civil defense in the defense of the country, not how you protect the population from a civil standpoint, but how the military views it. The discussion arose, Mr. Chairman, a little earlier when you were out because I had noted an observation by Dr. York before the Appropriations Committee, considering the Zeus.

His observation was that fallout shelters are a more effective way of saving lives than the Zeus program, presumably based upon the con-

sideration that the Zeus, being a fixed defense system, would entail many Zeus installations around the country, and would run into $10 billion, isn't that a likely figure?

Dr. YORK. Yes.

Mr. ROBACK. So for $10 billion you can build a lot of civil defense shelter. So it becomes a question of alternatives in what you are trying to do with those investments. This is an appropriate subject, I think, for ARPA to study.

Mr. HOLIFIELD. I would ask the question in a little different way than Mr. Roback. I would ask if it is appropriate for ARPA, as long as it is in the field of advanced projects, to study the effects which might result from a strategy which requires the use of many megatons of nuclear weapons, both in offense and defense, and to study the effect upon the primary purpose of the Defense Establishment, which is to protect the lives of the people of the Nation?

And if they have adopted a strategy, by necessity, the primary purpose of which, of course, is to defend the Nation, but the secondary effect of which, if it has to be used and if it is used by the enemy, will doom the Nation.

Then is that an appropriate matter for the ARPA people to study, or can they divorce themselves from the secondary effects, as one military witness did before our committee when he said, "My job is to have the missile ready, to get it off the ground at the enemy." He said, "It is somebody else's job to protect the people's lives."

I wonder if that is the position of the Defense Department?

Secretary DOUGLAS. Well, I think the traditional view has been, and I think this is supported by the responsibilities of other agencies that are in existence, that the military concern has not been primarily addressed to the civil population.

Mr. HOLIFIELD. Isn't your basic purpose the preservation of the lives and the continuity of our Nation through the preservation of the lives of the people?

Secretary DOUGLAS. I think that the purposes with which we are concerned, the ultimate purposes are identical, and this gives good point to the questions that you raise.

I think that questions can be posed, such as the one which was referred to, which was addressed to Dr. York, that can produce useful thinking and studies, and as I said, I am sure that this problem will receive increasing attention.

I think there has been a reluctance and I think that there is some basis for it. I think that the effect, under some circumstances, of overemphasizing passive defense interferes with doing things that are far more important.

Mr. HOLIFIELD. In other words, what you are really saying, sir, is that budgetwise it is more important to spend the money for additional deterrent factors than it is to give concurrent consideration to the effect of an exchange of the type of weapons which we are producing?

CIVIL DEFENSE IMPORTANCE IS INCREASING

Secretary DOUGLAS. I think that has been so up to the present time. And I think we are, in our programs, reaching a point of development and a planned deployment of weapons systems where the possible

contribution to our deterrent strength of civil defense moves into a more important position.

Mr. HOLIFIELD. You are seeing a spread of neutralism throughout the world, particularly throughout Europe, and in other places. Some of the factors that you brought up in regard to our lack of dependence upon bases outside the United States are indications of this. The refusal of some nations to allow us to place bases on their territory is the fear that they would magnetize that nation as a target.

This is going to continue to spread, as people become more knowledgeable on the subject of these mass-destruction weapons. And it is a factor that the Defense Department is going to have to look at, sooner or later, as a matter of pressure of people's opinions. They are not going to continue to remain in ignorance on this subject and they are not going to continue to support a system of defense which foredooms them to destruction in case it is used.

Secretary DOUGLAS. I don't feel that there is any suppression of the information that is available——

Mr. HOLIFIELD. I am not accusing you of suppressing, of course. I am stating a condition that exists. Although I will say this, that the Defense Department is the most responsible group for the military strategy, and rightly so, of the Nation.

But if that military strategy changes from the methods of warfare in the past, which left the civilian populations relatively free of the results of warfare, and if they take, of necessity, the types of weapons on both sides, our potential enemies as well as ourselves, that change the complexion from one of a struggle between military people, with a secondary effect upon population, to the fact that if the struggle occurs between the military people then the populations of the various countries in which these weapons are used are foredoomed to destruction in terms of millions and hundreds of millions, then you are going to face a reaction which, as I say, is already beginning in the world and which our enemies are very cleverly using in their propaganda war.

Secretary DOUGLAS. I am sure they will continue to use it.

COMPETENCE OF IDA FOR CIVIL DEFENSE STUDY

Mr. ROBACK. Mr. Chairman, the reason I brought ARPA into this discussion is that when this committee issued a report on civil defense in 1956, in which there were rather positive recommendations for a shelter program, that matter was presented to the President through the Civil Defense Administrator. The President appointed a committee known as the Gaither Committee. The Gaither Committee, on the basis of recommendations arising from this committee, ultimately had to consider the whole defense problem, and the technical staff to the Gaither Committee was an organization known as IDA, which is technical staff to ARPA.

You see, they have the competence, and also it is a problem which the Gaither Committee found was not simply a civilian home-protection problem, but a defense problem.

That is the reason why I raised the possibility that this might be an appropriate sphere of activity for ARPA, among its many other responsibilities.

Secretary DOUGLAS. We will be glad to respond to that question, but I would rather give it a little more thought and consideration.

Mr. HOLIFIELD. We are certainly not insisting on an answer at this moment. But I am heartened by the fact that you tell us that you are considering it. I trust that consideration is not the "due consideration" which is a common phrase in some Congressmen's letters to their constituents.

Mr. Secretary, we are going to adjourn at this time. I will ask for the privilege of forwarding to you written questions on areas that we haven't covered, and the answers to those questions would be included in our hearing record.

Secretary DOUGLAS. We would be very happy to respond to your questions.

Mr. HOLIFIELD. I appreciate very much your attendance here. I know how busy you are. Again, this committee wants to commend you and Dr. York and your associates for the fine work that you are doing.

Secretary DOUGLAS. Thank you, sir.

Mr. RIEHLMAN. I would like to add my word of commendation to Dr. York, because of my association with him on another committee, and the fine cooperation he is giving between the Department of Defense and NASA, which really have problems that are closely related. But I think their working relationship and the programs that they have set up at this time are excellent.

And I think it is due to Dr. York's willingness and the people in the other Department to really set up this type of working arrangement, which I am sure is going to be very productive. And we are proud that he is in the organization.

That is what gives the organization exactly what it needs, moving forward in programs that are so essential.

Dr. YORK. Thank you.

Mr. HOLIFIELD. The subcommittee is adjourned.

(Whereupon, at 12:32 p.m., the subcommittee adjourned to reconvene at 10 a.m., Wednesday, May 4, 1960.)

ORGANIZATION AND MANAGEMENT OF MISSILE PROGRAMS

Part II—Air Defense

WEDNESDAY, MAY 4, 1960

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON MILITARY OPERATIONS
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met at 10 a.m., in room 1501–B, New House Office Building, Hon. Chet Holifield (chairman of the subcommittee) presiding.

Present: Representatives Chet Holifield, Martha W. Griffiths, and R. Walter Riehlman.

Also present: Herbert Roback, staff administrator; Douglas Dahlin, and Paul Ridgely, staff members.

Mr. HOLIFIELD. The subcommittee will be in order.

The subject of our hearing today is air defense. As witnesses, we will have Dr. J. P. Ruina, Assistant Director, Defense Research and Engineering for Air Defense Systems; Maj. Gen. H. M. Estes, Assistant Deputy Chief of Staff for Operations, U.S. Air Force; and Maj. Gen. B. K. Holloway, Director of Operational Requirements, U.S. Air Force.

I understand Dr. Ruina and General Estes both have prepared statements. I suggest we begin by first having Dr. Ruina read his statement. Then we will continue with General Estes' statement. I see by the brief biographical sketch on Dr. Ruina that he has a distinguished background. He is on loan at this time from the University of Illinois, served as Deputy for Research to the Assistant Secretary of the Air Force in 1959, and in 1960 he is Assistant Director of Defense Research and Engineering for Air Defense in the Office of the Secretary of Defense.

Prior to coming to the Pentagon Dr. Ruina served on various technical panels and committees for the Department of Defense. He has also participated in the National Academy of Science study of long range Air Force research in the summer of 1958.

It is a pleasure to have you with us this morning and you may proceed with your statement.

Mr. ROBACK. Excuse me. This is Dr. Ruina's first appearance before a congressional committee and we have been requested to go easy on him. [Laughter.]

Mr. HOLIFIELD. We go easy on everybody, Dr. Ruina. You will have no trouble here this morning. Just be at ease, and go right ahead.

STATEMENT OF J. P. RUINA, ASSISTANT DIRECTOR, DEFENSE RESEARCH AND ENGINEERING (AIR DEFENSE); ACCOMPANIED BY JOHN W. KLOTZ, DEPUTY

Mr. RUINA. Mr. Chairman, my name is J. P. Ruina. I am on leave of absence from the University of Illinois, and have just completed approximately 1 year's service as a Deputy to the Assistant Secretary of the Air Force for Research and Development. I am glad of the opportunity to appear before you to discuss aspects of our research and development efforts in air defense. Since I have only occupied my present position in the Department of Defense for about 3 weeks, I may not be able to provide immediate answers to all your questions. However, I shall attempt to answer them to the best of my ability.

I understand that you have a special interest in the ballistic missile early warning and active defense areas, as well as in NATO air defense. Our situation in regard to conventional air defense against manned bombers will be described by General Estes, General Holloway, and members of the Air Force staff later this morning.

With regard to defense against ballistic missiles, which I will be particularly concerned with this morning, I must emphasize that the advent of these weapons has presented us with unprecedented problems in the research and development field. The prognosis for achieving an effective ballistic missile defense ranges from serious doubt to, at best, cautious optimism. Because of the technical difficulties which we encounter in this area, and because of the unprecedented nature of the threat, we cannot allow any approach to be unexplored.

I will now discuss various programs in this field, beginning with the programs for early warning which are so important for the alerting of our retaliatory forces.

BALLISTIC MISSILE EARLY WARNING SYSTEM (BMEWS)

I would like to start with our early warning system known as BMEWS. This is a system consisting of three radar sites in the northern regions, located respectively in Greenland, Alaska, and the United Kingdom. The design is such as to give a very high probability of detection against any massive ICBM attack against the United States launched over the polar regions. The expected performance of the system should be adequate to provide approximately 15 minutes warning time.

Some technical questions still remain as to the desirability of providing supplementary tracking radars at the detection radar sites, and this has been taken into account in the construction so that trackers can be added at a later date if desired. There is no great technical risk in this program. The first of the sites is already radiating radio frequency power. All three sites will be operational by 1963.

It should be noted that BMEWS will not provide early warning against submarine or aircraft launched ballistic missiles, or against missiles launched the "long way around" over the antarctic regions. These limitations are significant and are receiving serious consideration in the Department of Defense.

MIDAS

As a future means of greatly extending our early warning capabilities, we are engaged in a high-priority program to develop a satellite system utilizing infrared detection techniques. Such a system, if successful, would detect ballistic missiles launched anywhere on earth, and do so in the early launch phase. Perhaps 15 extra minutes of supremely important warning time would be added to our BMEWS capability.

MIDAS has serious technical problems to overcome, one of the most important being that of reliability—of insuring a long enough orbital life so that the replacement rate does not become inordinately expensive.

We are working very hard on this program and supporting it at a high priority.

OVER-THE-HORIZON RADAR

Additional early warning capability may be provided by the various programs in over-the-horizon radars being sponsored by all three services. In general, these involve the use of frequencies lower than is common in the radar art, which can therefore avoid, to some extent, the "line-of-sight" limitations of conventional radars. Unfortunately, the efficacy of their performance depends greatly on the state of the atmosphere at any given time, and hence they cannot be depended upon for a high degree of reliability. They may eventually become a supplement to, but not a substitute for, our more conventional BMEWS capability.

NIKE-ZEUS

Turning now to the subject of active defense against ballistic missiles (that is, shooting down the missiles in flight), we have one large weapon system program under development (the Nike-Zeus), as well as a great deal of study effort going on concerning possible alternative approaches.

The Nike-Zeus program is being carried on by the Department of the Army. It is being designed as a terminal system, one which will shoot down the missiles close to their impact point. Although the Nike-Zeus system must of necessity be far more sophisticated in its electronics than is, for example, BMEWS, there is little doubt that it can be effective against low-rate-of-arrival single warheads.

This is no mean achievement in itself and should not be underestimated. Ballistic weapons from stones to rifle bullets have never been successfully attacked in this way before, and it is a tribute to the technical competence of the engineers working on this program that well-informed scientists agree that the approach is feasible.

When the probability is considered, however, that the enemy can, without prohibitive cost to himself, provide for nearly simultaneous arrival of multiple targets, either decoys, or perhaps even true warheads, then it is clear that in its present design the Nike-Zeus' firepower can be rather easily saturated. The ground electronics of the system are also vulnerable to blast, so that a Nike-Zeus battery can be rather easily "taken out." These are some of the fundamental reasons that a production decision on Nike-Zeus has been deferred.

A majority of the Joint Chiefs of Staff concurred with this decision. We do, however, consider it essential to proceed with the development and testing of the system, in order to gain the experience necessary if we are ever able to attain an effective terminal system. It may be that the attainment of an effective terminal system cannot be achieved in the foreseeable future, but we must establish this on the basis of knowledge and experience and not conjecture.

DEFENDER

Under the name of Project Defender, we are sponsoring, under the administration of the Advanced Research Projects Agency, a large research program aimed at providing possible new approaches to ballistic missile defense. No approach, even if of the "blue sky" variety, is being neglected. Some of the areas which we are investigating are more effective kill mechanisms, measurement programs on our own ICBM's to provide greater understanding of ICBM behavior, advanced system studies, and decoy discrimination techniques.

As you appreciate, it is only by pursuing research programs of this nature that we can hope to progress in this critical field. We, therefore, consider this one of our most important programs.

SATELLITE SURVEILLANCE AND INTERCEPTION

The questions concerning satellite surveillance and interception are complex, involving scientific relationships between nations as well as the purely military aspects with which the Department of Defense is concerned. Up until now our primary effort has been devoted to systems capable of detecting, calculating the orbits, and cataloging all satellites that pass over the United States. We have also conducted studies of the problems associated with satellite inspection. Since we do not require inspection on first pass, the system requirements for inspection are easier to achieve than an effective ballistic missile defense.

NATO AIR DEFENSE

The assessment of the air defense of Europe involves consideration of many interacting factors which may not be really apparent. Warning time is very limited, both for aircraft and missiles. This fact, together with the limited air space available, makes it impossible to utilize the defense-in-depth concept in Europe as we have in North America. To illustrate, although our European NATO radars may observe large scale maneuvers of hostile aircraft, this observation alone cannot be interpreted as an indication of the initiation of enemy hostilities, and cannot be used in most instances as an alert signal to defensive interceptor forces.

Having made the above observations, I do not intend to detract from all the efforts that have been made thus far in European air defense. As a result of research and development support from the United States to the various NATO countries there is in existence today an efficient and reliable communications network extending from the north in Norway, through central Europe, and south through Italy, Greece, and Turkey.

These communications link together a growing network of modern radars which provide the basis for a warning system serving the SHAPE headquarters in Paris. At the present time, this network in its aggregate has the capability to act as an alerting and warning system for the NATO nations. Obviously, communications exist between SHAPE Headquarters and our own North American defensive forces.

Further, as a result of our research and development support and our sharing of technical information with the NATO countries, they are deploying modern interceptors and some of our advanced surface-to-air missile systems—Nike-Hercules and Hawk. In the case of Hawk, they are going into production of this missile. The concept of the surface-to-air missile defenses is for a defensive zone in Western Germany extending from the southern border north through the low countries. This defensive zone will be augmented and backed up by the interceptors, which are deployed to the west of the missile defenses.

Ballistic missile defense in Europe, because of the extremely short warning time, is indeed a formidable problem. Whereas there is 10 to 20 minutes of warning available to our North American retaliatory forces, only 3 or perhaps 5 minutes of warning exists for forces deployed in Europe. In spite of this disadvantage, we are offering such technical assistance to the European NATO countries as they desire. We have the ultimate objective of augmenting the United States-United Kingdom BMEWS with the coverage of the European warning system. This will reciprocate the coverage available to NATO from the United States-United Kingdom BMEWS sites.

Mr. Chairman, this concludes my prepared statement. Mr. John W. Klotz, my deputy, and I will be glad to answer any questions.

Mrs. GRIFFITHS. Thank you very much. The chairman had to leave briefly.

Do you have any questions you would like to ask?

Mr. ROBACK. Excuse me, Madam Chairman. Mr. Holifield suggested that the other statement be read before questions.

Mrs. GRIFFITHS. That will be fine.

Mr. ROBACK. General Estes?

STATEMENT OF MAJ. GEN. HOWELL M. ESTES, JR., ASSISTANT DEPUTY CHIEF OF STAFF, OPERATIONS, HEADQUARTERS, U.S. AIR FORCE; ACCOMPANIED BY MAJ. GEN. BRUCE K. HOLLOWAY, DIRECTOR OF OPERATIONAL REQUIREMENTS; COL. A. R. SHIELEY; COL. D. L. CROWE; AND COL. F. H. DIETRICH

General ESTES. Mr. Chairman, members of the committee, I would like to express my appreciation for the opportunity to present to this committee an overall view of the Air Force program for air defense. As requested by the committee, I will discuss specific reprograming actions that pertain to the revised air defense program. Before discussing the specific details, however, I feel it important to establish clearly why a revision to the original air defense program was considered necessary and advisable.

In analyzing the total air defense system, including detection radars, control facilities, and interceptor weapons, the Air Force determined

that full operations capability would have been achieved at a later time period than appeared consistent with the changing nature of the Soviet threat. Further analysis disclosed that many new features would have had to be added to the planned air defense system in order to retain a strong capability against the manned bomber threat in the face of an initial strike by Soviet ICBM's. These features would have included more hardening of the supercombat centers, hardening and dispersal of Bomarc, and positive provisions for fighter-interceptor survival. Accomplishment of this added sophistication in the defense system against bombers would have added materially to the total cost of air defense as then planned and would have further delayed achievement of full operations capability.

In consideration of anticipated funding, adherence to an air defense program that included these added features would have resulted in a disproportionately large expenditure for defense against bombers and a proportionately limited program to counter the more advanced ICBM threat. In addition, such a system would have become operational at a time when the bomber threat, though continuing to exist, would have been far overshadowed by the missile threat.

Logic, therefore, indicated that the Air Force should reduce the previously planned air defense programs against manned bombers to a level that would permit the earliest possible completion of a modernized air defense system and further should apply the funds thus released to foster projects more alined against the future threat.

Cancellation of the supercombat centers and reduction of the Bomarc "B" program were the two major recommendations resulting from our analysis. The "A" and "B" missile units remaining in the Bomarc program will be deployed in the heavily populated industrial Northeast. It should be noted that no change is recommended in the original plan to provide Bomarc for the RCAF. The exact number of Bomarc missiles to be deployed on the two Canadian sites is currently under joint consideration at Headquarters, North American Air Defense Command.

In addition to achieving, by these changes, a more timely completion of an improved air defense against the air-breathing threat, the Air Force will be able to apply a portion of the released funds toward accelerating systems designed to provide ballistic missile warning and will attain an improved deterrent posture by the procurement of additional ICBM's for the Strategic Air Command.

I will now take up the specific program changes in more detail. These changes fall into three major categories: First, reductions in the air defense ground environment; second, reductions in air defense weapons; and third, certain program additions made possible from the funds released by these reductions.

REDUCTIONS IN AIR DEFENSE GROUND ENVIRONMENT

Beginning first with the air defense ground environment, you will recall that this consists of a network of radar, communication, and identification stations tied together by SAGE direction centers into a closely integrated command and control system. This semiautomatic ground environment system provides the vital air defense functions of detection, identification, control, and communications.

Detection of enemy aircraft is accomplished primarily by radars. Because of the vital importance of achieving effective and reliable detection, and because of the inadequacies of our existing radars, the revised air defense program does not materially change our previous radar program. Some gap filler radars and some modifications to our airborne early warning and control fleet have been eliminated due to changes in weapon deployment.

In addition, we are giving serious consideration to the inactivation of some of the radar sites in the interior of the United States and in eastern Canada so as to concentrate our resources on the perimeter. This is in line with the DOD master air defense plan issued last summer.

The next function performed by the ground system is that of identification. Procurement of ground and airborne equipment for this function has been completed with prior year funds. Ground installation is essentially complete. No change is being made to these installations in our revised program except for possible deletion of those facilities associated with the radar sites we are considering for inactivation.

The next area, that of control, is performed primarily by the SAGE direction and combat centers with which I am sure you are familiar. The program supported by our original fiscal year 1961 budget called for the completion of 22 direction centers, 3 combat centers, and 8 hardened supercombat centers. Our revised program cancels the supercombat centers and rearranges part of the remaining system. This rearrangement will be accomplished by certain changes in division and sector boundaries and by installing a direction center in a Canadian area at an early date. The program supported by our original fiscal year 1961 budget would have been completed at the earliest in calendar year 1964.

Our recommended program will be completed considerably earlier than the previous program.

The last function performed by the ground system is that of communications. Equipment for the necessary communications stations has all been placed on procurement with prior year funds. Construction of some of the stations and antennas remains to be funded in the fiscal year 1961 budget. As a result of changes in weapons deployment it is possible to make a small reduction in the number of communication stations required. Our revised communication program will also be completed somewhat earlier than the previous program.

REDUCTIONS IN AIR DEFENSE WEAPONS

Next, I will discuss our recommended changes to the air defense weapon programs. We have recommended that the Bomarc "B" program be adjusted to provide nine squadrons. The Bomarc "A" program would remain unchanged. This represents an overall reduction from our previously planned 29 squadrons to 16 squadrons. These missiles are to be located at 10 bases in the northeastern United States and in southeastern Canada.

With respect to fighter-interceptors, the F–102 portion of the interceptor fleet in the continental United States is proposed to be manned by the Air National Guard. The F–101 and F–106 interceptors will

be redeployed to a limited extent and will continue to be manned by the Regular Air Force. All of the Regular Air Force interceptors will be nuclear armed and provided with certain modifications which will significantly increase their operational capability. The Air Guard F–102 force will be nuclear armed to the extent possible with the resources available.

The F–101's, F–102's, and F–106's must, insofar as possible, fill the void created by our decreased Bomarc program. Therefore, we propose to use some of the resources released to achieve further modernization of our interceptor force. The modifications involved will improve interceptor performance in an electronic countermeasures environment by adding more advanced features to the fire control systems and by improving the armament for the F–101.

In addition, a new fire control system and missile of advanced capabilities for interceptor aircraft known as the ASG–18 and GAR–9, have been under development since 1956. We consider it extremely wise to continue this program on a modest basis as an insurance policy against the posibility of an increased bomber threat in the future.

PROGRAM ADDITIONS UTILIZING FUNDS RELEASED BY REDUCTIONS

This concludes my remarks concerning the major changes in our program for defense against bomber attack. Next, I will cover certain additions to other Air Force programs that we recommend be accomplished from the resources released by the changes in our air defense program. To improve our defenses against ballistic missiles we would like to accelerate the ballistic missile early warning system, the BMEWS system to which Dr. Ruina referred, to the greatest practicable extent. With additional money on the BMEWS program the operational date of the site II (Clear, Alaska) can be advanced and the operational date of site III (Fylingsdale, England) can also be advanced.

In the Discoverer program we need to provide additional Thor boosters and Agena vehicles for further development of components or systems to be used in a space environment. These vehicles will be used in calendar year 1961 and 1962.

As a result of progress made in the Discoverer program and the successful ground test of MIDAS, we recommend the MIDAS program be accelerated in order to make possible a fully operational system at an earlier date.

With regard to our offensive forces, we are recommending a change to the configuration of the last six Atlas squadrons from 9 launchers per squadron to 12 launchers per squadron. Funds to be programed in fiscal year 1960 will cover costs of "brick and mortar" facilities and the remaining funds will be programed in fiscal year 1961 for missiles, ground support equipment, installation, and equipment checkout. By using the funds in this way, we are getting the same number of Atlas squadrons on launchers that we would get by building two additional squadrons; however, since no new squadron support facilities are required, this increase in force strength is being obtained more economically than it would be if totally new squadrons were purchased. This additional force comes very appropriately in a critical time period.

Finally, we recommend that the Minuteman program be augmented. Additional funds are needed to accelerate design and fabrication efforts on the mobile version.

OBJECTIVES

In conclusion, the Air Force feels that three primary objectives will be attained by the actions we are recommending. These are:

1. More timely completion of an improved defense against the air-breathing threat;
2. Acceleration of systems designed to provide ballistic missile warning; and
3. An improved deterrent posture.

We are convinced that attainment of these objectives will serve to provide the United States with an improved overall defense posture more consistent with the existing and anticipated threat.

This concludes my statement, Madam Chairman.

Mrs. GRIFFITHS. Thank you very much. Do you have any questions?

Mr. RIEHLMAN. Not right at this time, Madam Chairman.

SAGE SUPERCOMBAT CENTERS

Mrs. GRIFFITHS. I would like to ask the general: On page 5 you refer to the hardened supercombat centers. You are going to remove eight of them. Why?

General ESTES. Well, as I said in the statement, Mrs. Griffiths, in our analysis of the situation we found that if we continued to completion with these eight supercombat centers, we would have them all operational very late as compared to what we considered the overall threat to be in that same time period.

Furthermore, due to advancements which are apparent in Soviet ballistic missiles, we believed that the hardening which we had planned for those centers would be inadequate to withstand the capabilities which the Russians would have during that time period.

Therefore, it would have been necessary in our opinion to build those supercombat centers in a hardened configuration capable of withstanding a much greater pounds per square inch overpressure than we had previously planned. This would have done two things. First, it would have added to the cost of those supercombat centers to a material extent. But even more importantly, it would have delayed their availability until a date even later than our analysis showed would have been the case under the previous planning. It was our opinion, therefore, that these actions were not consistent with what we required to improve our capabilities for this particular time period.

MINUTEMAN

Mrs. GRIFFITHS. Now, I would like to ask you, on the Minuteman program, where you state on page 8 that you recommend that the Minuteman program be augmented and point out that additional funds are needed to accelerate the design, did you get the funds?

General ESTES. The subcommittee—let me start first by saying that the Department of Defense has fully concurred in our recommendation. The Subcommittee on Military Appropriations of the House

has recommended that these funds be approved. I believe the bill is now pending before the House.

Mrs. GRIFFITHS. Did the Budget Bureau object or go with you——

General ESTES. They did not object.

Mrs. GRIFFITHS. They went with you?

Mr. RIEHLMAN. If that is true, General, would that be in the defense appropriation bill that we have under consideration at the present time?

General ESTES. It would, Mr. Riehlman, yes, sir.

Mr. RIEHLMAN. It would be included in it?

General ESTES. Yes, sir.

Mr. RIEHLMAN. Thank you.

Mrs. GRIFFITHS. Do you have some further questions?

Mr. RIEHLMAN. No, counsel is going to start and then I have two or three.

JOINT USE OF SAGE BY FAA

Mr. ROBACK. General Estes, what happens to the arrangements with the Federal Aviation Agency which were predicated upon development of supercombat centers?

General ESTES. Obviously, Mr. Roback, the previous planning between ourselves and FAA, to develop a system which would both provide for air defense and for control of air traffic over the United States, through the means of these supercombat centers, has been thrown out by our deletion of the supercombat centers.

It is now necessary for the Federal Aviation Authority and the Air Force to work together to find other means of providing this joint capability. I am sure the committee appreciates the importance of this, not only from the standpoint of providing an improved air traffic control capability over the Nation, but also in the identification function in air defense. I have personally had discussions with General Quesada on this, Administrator of the FAA, further, action level people of the FAA and Air Force are right now studying ways and means by which we can still provide these capabilities even without the supercombat centers.

Finally, the FAA has been working with certain technical organizations of the Air Force, located near Boston, as well as with the Air Staff, to develop further possibilities. Therefore, in summary, the exact means by which we intended to provide this dual capability have been eliminated through the loss of the supercombat centers.

There are, however, other means by which this can be accomplished and those means are currently under investigation.

INTEGRATED NEEDS OF AIR DEFENSE AND TRAFFIC CONTROL

Mr. ROBACK. So that we can give a little setting to this part of the discussion, General, the logic of air traffic control and air defense integration lies in the fact that whoever has to defend and whoever has to direct traffic both need to know what is flying around in the sky, isn't that the case?

General ESTES. That is true.

Mr. ROBACK. So it would seem to make sense that both of them work together. Can you describe briefly what arrangements were in the making or have been made looking toward such integration?

General ESTES. Originally, we had intended initially using for this purpose the first new computer that would have been put in the supercombat centers which is known as the AN/FSQ–7A, a transistorized computer.

This computer, with an extremely large capacity for rapid problem solution, would have been installed at Albuquerque.

It was our intent to begin FAA–USAF coordination on this dual problem in that center, by having both FAA personnel and USAF personnel in the Albuquerque center working out our joint problems.

On this basis, the requirements, the detailed requirements for FAA equipments in the eight supercombat centers, and the detailed procedures which would be used between the Air Force and FAA were to be worked out.

Subsequent to this, as the eight supercombat centers were built, the FAA regional offices, their regional centers, across the country, were to have been removed to the supercombat centers, so that the actual regional office and the supercombat center would have been located together.

This would mean that the regional control of air traffic and the regional control of air defense would have been colocated.

The boundaries of the Air Defense Control Commands and the boundaries of the regional offices of FAA had previously been colocated to permit this activity to occur jointly.

WHITE HOUSE AGREEMENT

Mr. ROBACK. Is there a White House agreement bearing upon this matter, as to cooperation between the Air Force and FAA, which set the terms of reference for this work?

General ESTES. I can't answer that question of my own personal knowledge.

Colonel SHIELEY. Yes, sir; there was a White House, or still is in force a White House agreement.

Mr. ROBACK. Briefly, what is the nature of the agreement?

Colonel SHIELEY. This was one that was put into force about the time that General Curtis, prior to the establishment of FAA, was involved in the air traffic control, and the nature of the agreement in general is encouraging the integration of military air defense operations and civil traffic operations and setting the basic groundwork for our cooperation in this field.

It is a general agreement along this line.

Mrs. GRIFFITHS. Would you give your name to the reporter?

Colonel SHIELEY. Colonel Shieley.

Mr. ROBACK. Within the framework of this general agreement between the two agencies, these integrated efforts were being worked out, is that correct, General?

General ESTES. That is correct. I misunderstood your previous question with reference to it. I thought you meant particularly with reference to the super combat centers.

SUPERCOMBAT CENTERS NECESSARY FOR FAA PURPOSES

Mr. ROBACK. And the super combat centers were to become the focal point of actual operations for the two agencies, the super combat centers which are now canceled?

General ESTES. That is not entirely correct, sir. As far as FAA is concerned, it is correct. As far as the Air Force is concerned, I mentioned in my statement the 22 direction centers. Factually, the air battle would have been fought by those direction centers with the super combat centers providing constant monitoring and surveillance.

As you realize, the 22 direction centers to which I referred are in a soft configuration. In the event in the area of any super combat center one of the direction centers had been knocked out by attack, then the super combat center would, in fact, pick up the air battle in that area.

So consequently they were to perform a monitoring and backup function and would only have entered the air battle directly in the event of loss of one of the direction centers.

FAA USE OF MITRE

Mr. ROBACK. Did the FAA have contracts looking toward some of the technical requirements of this integration program, do you know?

General ESTES. Yes, sir.

Mr. ROBACK. And were those contracts let through the Air Force?

General ESTES. I believe the contract that I have in mind, particularly, was direct between FAA and our technical agency, sir.

Mr. ROBACK. What is that agency?

General ESTES. The Air Force established a few years ago an organization known as the Air Defense Systems Integration Division, ADSID. This organization required a technical competence to back up its integration efforts. A corporation was formed, a nonprofit technical corporation known as MITRE, MIT-Rand Engineering. This organization and ADSID were colocated together, with the technical organization of MITRE being subordinate to ADSID.

The FAA contracts were directly with the MITRE Corp., that is my belief.

Colonel SHIELEY. Yes, sir, that is correct.

Mr. ROBACK. So that MITRE was working on these problems jointly for the Air Force and for FAA?

General ESTES. That is correct, yes, sir.

Mr. ROBACK. Do you know what happens now? Are those contracts still in force?

General ESTES. It is my understanding that the basic contract has been cancelled or is in process of being cancelled, or being modified towards the issue that I expressed earlier—towards finding a solution to our joint problem now that there are no super combat centers planned.

MOTIVES FOR JOINT USE

Mr. ROBACK. General Estes, with regard to the cooperation of FAA, it is not usual that a military agency would welcome civil operations in the same house, so to speak. Now, some people believe that the only reason that the Air Force has fastened onto this cooperation is because it gives them a chance to get the combat centers constructed.

General ESTES. I would reject any such implication.

Mr. ROBACK. You would reject it. Have you ever heard that said?

General ESTES. One hears all kinds of things, Mr. Roback. I would reject it as an answer as to why we went forward with it.

Mr. ROBACK. You think there is no basis for any such supposition?

General ESTES. None whatsoever.

RELIABILITY OF MIDAS

Mr. ROBACK. You know, in understanding statements that are presented to the Congress, the Members always have difficulty because they only get the rosy side of the picture. It is difficult to interpret, and they feel let down when something doesn't work out the way it was presented.

If I may, and if I read the situation correctly, I will try to give an example. General Holloway told the Appropriations Committee that MIDAS will provide the United States with a highly reliable ICBM attack alarm system, which they are entitled to say and is the usual form of statement.

Mr. Ruina is telling us this morning the MIDAS has serious technical problems to overcome, one of the most important being that of reliability. You see, the average citizen could understandably be confused. [Laughter.]

Will you comment on that, Mr. Ruina?

Mr. RUINA. I think perhaps the word "reliability" is used in two different senses.

Mr. ROBACK. I hope so. [Laughter.]

ELECTRONIC RELIABILITY

Mr. RUINA. The term "reliability" as I used it was meant as mean time to failure of the electronic equipment.

The MIDAS payload has, I don't know exactly, but many thousands of components. If any one of these or several of these break down, the system become inoperative. The question we have now is whether we can take a payload as complex as this, have it go through the strains of being put into orbit and remain in good health for a period of a year or so.

If the electronic equipment is working, I think we can say the system will work effectively. It is doing a rather simple job.

MISSILE LAUNCH RELIABILITY

Mr. ROBACK. Is reliability here the same problem, the same order of problems as reliability of an Atlas, say?

Mr. RUINA. No; we have all the problems of the reliability of an Atlas, in other words, getting the thing up there and in addition, we have a very complex electronic package that is in orbit. You don't have that in Atlas.

Once Atlas is in orbit, it is a rather simple device.

Mr. ROBACK. Once you put a satellite detection system in orbit, you say that is the easiest part of the problem?

Mr. RUINA. I wouldn't say that. It is the easiest from the electronic engineers' point of view. We have a lot of experience in getting

things into orbit, but we don't have much experience in designing equipment that will go through the strains of getting into orbit and remaining operative for so long a period of time.

Mr. ROBACK. Would you be able to say how many orbiting vehicles would be required for an initial operational capability, as they say?

Is that a classified piece of information?

Mr. RUINA. I think that would be classified.

MIDAS VS. TIROS ELECTRONIC RELIABILITY

Mr. RIEHLMAN. Could I ask this question: How would you compare the MIDAS, its technical equipment, and its stability in orbit, with the present weather satellite that we have in orbit?

Mr. RUINA. It is more complex and we are asking it to stay operative much longer.

Mr. RIEHLMAN. Aren't you able to garner some technical information and helpful information as to the capabilities of this weather satellite that we have?

Mr. RUINA. I think from the weather satellite information we can be rather encouraged, but it still doesn't solve the problems we have completely, because you have something more complex here, we are asking it to operate for a year, not weeks.

Mr. RIEHLMAN. Well, do I understand that our weather satellite is only going to be in operation for a period of weeks? I was of the opinion that it was going to be longer than weeks.

Mr. RUINA. I don't know exactly what the Space Agency expects of it.

Mr. RIEHLMAN. I should know, myself, because I am on the other Committee on Science and Astronautics, but I am certain that they anticipate that the reliability of that is going to be more than just for a few weeks, because we have been getting back astounding information and pictures, I think.

Mr. RUINA. I can add one thing: Comparing the number of parts in MIDAS, if that is a measure of complexity, to the weather satellite, MIDAS is a more complex package.

MIDAS SYSTEM RELIABILITY

Mr. ROBACK. Is it a question how long the vehicle stays in orbit or how long the electronic machinery functions?

Mr. RUINA. How long the electronic machinery works.

Mr. ROBACK. And that is the area in which problems have to be solved mainly; would you say?

Mr. RUINA. Yes. I think I should modify what I said earlier. There is a question of how long the vehicle remains in orbit in its proper place as well.

There is a controlled orbit in MIDAS.

Mr. RIEHLMAN. For it to be effective?

Mr. RUINA. For it to be effective.

NIKE–ZEUS TESTS IN PACIFIC

Mr. ROBACK. Mr. Ruina, what type of studies are made in your agency with regard to the Zeus? Do you have any responsibility for

decisions about the Zeus? And when I say you, I mean the office in which you are located.

Mr. RUINA. Our primary responsibility is advising Dr. York on the progress and the technical problems that are involved in Zeus. Right now there is one serious question concerning the nature of the test facilities that are placed in the Pacific in 1962. Our responsibility is to be informed, to evaluate what the Army's plans are, and to advise the Director of Research and Engineering of these.

Mr. ROBACK. Is the test in the Pacific going to be directed toward the Zeus or is that part of a larger test program?

Mr. RUINA. It is directed for the Zeus. The Zeus system is being set up at Kwajelein.

At the same time the Advanced Research Projects Agency is taking advantage of Zeus' setup and the fact that Zeus will have targets aimed at it, to also have equipment there for their own measurements. But the Zeus program is working independently of the ARPA program.

COST OF PACIFIC TESTS

Mr. ROBACK. Do you have in mind the estimated cost of this test program?

Mr. RUINA. Of the test program in itself, I don't have the approximate cost, but perhaps Mr. Klotz knows these figures, the information I have is that it might be in the order of $150 million.

Mr. ROBACK. I have seen a figure in the appropriation hearings and I wonder whether it was a typographical error, it was in the order of $480 to $500 million.

Mr. RUINA. I suppose the numbers depends on what is included for the test. I think the number I quoted is perhaps for the cost of the installation in Kwajelein, itself. There are, of course, additional costs. I don't think this number can possibly include, I know it doesn't, as a matter of fact, the cost of providing targets for Zeus to shoot at. There would be an additional cost for that.

Mr. ROBACK. All you have to do is shoot off a missile, don't you?

Mr. RUINA. But these are very expensive and if you shoot off enough of them, it adds.

COST OF NIKE–ZEUS PROGRAM

Mr. ROBACK. Is it the case that one of the prime concerns about the Zeus is not that it will do all the things you want a weapon to do, but how much it costs?

Mr. RUINA. I would say they are both important.

Mr. ROBACK. Do you have any estimate of what a developed Zeus system costs? I mean with weapons in place. Do you have a program of deployment, for example?

Mr. RUINA. The number I have heard for deploying Zeus around the United States runs something like $15 billion.

DEPLOYMENT CONCEPT FOR NIKE-ZEUS

Mr. ROBACK. This is based on how many targets and what type of targets? You mean every principal city, for example?

Mr. RUINA. Let me check the number. That would be over a hundred batteries distributed around cities and bases that you want to protect.

Mr. ROBACK. If the Zeus were a concept for protecting, let us say, SAC bases, you wouldn't have anything like that many.

Mr. RUINA. No.

Mr. ROBACK. You wouldn't have anything like that cost. So it would depend on what your concept of continental defense was with regard to the Zeus.

Mr. RUINA. Yes.

Mr. ROBACK. Is there a plan extant for Zeus defense?

Mr. RUINA. I am sure that the Army has drafted various plans for how one can deploy Zeus.

At the minimum, I think we can think of Zeus as being deployed to protect very few areas, these areas being the control and command centers which you want to protect at all costs. I think in the other extreme you might consider having Zeus deployed around all major cities and all bases.

Mr. ROBACK. At any rate, when one talks about the cost of Zeus, one has to specify what type of defense system he has in mind.

Mr. RUINA. Yes.

Mrs. GRIFFITHS. For $15 billion and an inadequate defense, I think I agree with the witnesses yesterday; it would be better to build shelters.

Mr. RUINA. I have no reason to disagree with them.

EFFECTIVENESS OF NIKE-ZEUS

Mr. RIEHLMAN. Could I ask this question? I am sorry that I did not ask Dr. York yesterday, but I am sure that he made a statement before the Appropriations Committee that rather than put the $10 billion, which the Nike-Zeus might cost, into the construction of it, it might better be put in shelters.

Now, am I correct in assuming that that statement is based on the lack of effectiveness of this weapon should we go into production?

Mr. RUINA. Well, if you think of Zeus for the purpose of protecting the population—in that category—the effectiveness of Zeus is such that it would protect at least some. Estimates are, and I think we can't be sure until after the tests, that it would protect a rather small area. Therefore, if the aim of the enemy is to kill people, they can do this rather effectively in spite of the Zeus, and certainly then the investment in Zeus would be better put in shelters.

Mr. RIEHLMAN. Yes. But we haven't yet been satisfied that the Zeus is going to be an effective weapon, are we? Have we come up with that decision?

Mr. RUINA. I think one has to ask: Effective for what purpose? I mention in my statement that if you think of Zeus having the job of killing a single warhead, most of us are convinced that it will work or can be made to work.

DISCRIMINATION PROBLEM

Mr. RIEHLMAN. A single warhead. But suppose you have a number of warheads coming in and you have a lot of decoys in there, what are you going to do then?

Mr. RUINA. There again, if the area you want to protect is very small, allowing lots of time for sorting, trying different techniques for discriminating decoys from the warhead, there is a possibility, and I think only after the tests will we know for sure—that Zeus may be effective. But then the protected region is extremely small. How much protection you get depends on how small a region you are willing to protect.

Mr. ROBACK. This is true of all weapons, that they have relative degrees of effectiveness.

Mr. RUINA. Yes.

Mr. ROBACK. So you can't make unqualified statements that Zeus is effective or not effective.

Mr. RUINA. Yes.

FALLOUT FROM NIKE-ZEUS

Mr. ROBACK. Also, it depends on what type of defense system you have in mind. What is the fallout problem with regard to Zeus? Can you state it in open session? I am thinking in terms of the fallout problem because Zeus carries a nuclear warhead.

Mr. RUINA. I think that what one can say in open session is that if Zeus, carrying a nuclear warhead, has the kill take place in regions very close to populated areas, you just don't feel very comfortable.

Mr. ROBACK. What I mean is, what is the defensive weapon's contribution to the fallout? Is there a contribution?

Mr. RUINA. There would certainly be a contribution.

DISCRIMINATION PROBLEM

Mr. ROBACK. What is the status of the decoy problem? There are scientists in the Army, I understand, or have heard, that think this problem is either solved or solvable. You say it is solvable depending on the degree of solution?

Mr. RUINA. If it was solved, it was solved only on paper. This is an area where we have very, very little experience. We don't know exactly what all the characteristics of reentering bodies are. On the basis of rather extreme extrapoliations, some people feel that perhaps there will be methods of separating decoys from warheads. Actually this is done on the basis of extrapolation. We have very little experience here.

There is sort of a game that you play between the fellow who designs the decoys, how sophisticated a decoy he designs, versus the fellow who is trying to do the sorting. In general, I would say in playing the game on paper with the scientific information we have, the person who is designing the decoys has the upper hand at all times, he has the easier job by far.

COST OF NIKE–ZEUS PROGRAM

Mrs. GRIFFITHS. How much money would you say is being spent on Nike-Zeus now?

Mr. RUINA. I would very generally say that by the time we are done with the complete testing, the Nike-Zeus program will cost us in the order of $1 billion.

Mrs. GRIFFITHS. In my judgment, it is money wasted. It is the exact equivalent of betting your house, your lot, your children's lives on three nines, something like that. If someone comes up with a better hand, the game is over. You have lost everything you had.

NEED FOR ANTIMISSILE EXPERIENCE

Mr. RUINA. I don't completely agree that it is money wasted. We are dealing with an area in which the amount of experience we have is nil, we have none whatsoever. We can't very well extrapolate from any experience we have with antiaircraft weapons to say that a Zeus-type weapon can or cannot do. The area of ballistic missile defense is probably the most important research and development area in which the Department of Defense is operating. It is hard to say how many dollars a certain amount of experience is worth. We feel very strongly that any decisions we make as to what type of system we should ever build, have to be based on experience and knowledge. We have very little now. The Zeus system is one that we are counting on very heavily to provide just this sort of experience. A system we may build may be a modification of the Zeus, it may be the Zeus itself, but how would we ever know on the basis of paper studies, based on comparatively little scientific information?

Mrs. GRIFFITHS. But are you building it for experience or are you contemplating that you are going to achieve a final protection?

Mr. RUINA. I would say a little of both.

Mrs. GRIFFITHS. But you can't have a little final protection.

Mr. RUINA. No, the reasons——

Mrs. GRIFFITHS. How much is it really worth to have a little final protection?

Mr. RUINA. The protection I am thinking of perhaps is not what would result from deploying Zeus to the extreme that was mentioned before. It is quite conceivable that if the Zeus performs well, we may be interested in having a Zeus or a system very similar to Zeus deployed only around a few areas in the United States, where we think it is essential to have this protection. It would not completely provide for the protection of our populace. But it may be important for us to protect certain key spots in the United States for which we may want a Zeus or a Zeus-type system. Can we now afford to neglect this?

ANTISATELLITE USE FOR NIKE–ZEUS

Mr. ROBACK. Would it have a potential—talking on paper now—would it have a potential for shooting down satellites?

Mr. RUINA. Yes, it would have a potential for shooting down satellites. I think it is a bit too elaborate. If you are building a system just for the purpose of shooting down satellites, you may build a system which is less elaborate in many ways than Zeus is.

Mr. ROBACK. But on the basis of the knowledge you are gaining you can conceive this as a weapon against satellites?

Mr. RUINA. I am not sure just what degree of modification would be required on the existing Zeus if you wanted to shoot down satellites. The satellites are in many ways a lot easier to shoot down. If it is a satellite that has no controls on it, it goes in a predicted orbit——

Mr. ROBACK. You have more than one crack at it, too?

Mr. RUINA. You have more than one crack at it, you have more time, you don't have a few seconds to act. On the other hand, the intercept takes place at a much higher altitude. I am not sure of the propulsion system that is in the Zeus missile now, whether it has this capability.

Mr. ROBACK. It wouldn't be a breakthrough problem.

Mr. RUINA. No; I am sure of that.

EFFECTIVENESS OF BMEWS

Mrs. GRIFFITHS. I want to ask about this early warning system, how effective is it? Someplace here you were giving us——

Mr. RUINA. The early warning system in the form of the ballistic missile early warning system, the three radar sites?

Mrs. GRIFFITHS. I was looking at page 7 of the general's testimony, I believe, where you are talking about BMEWS.

General ESTES. Yes, that is the same system Dr. Ruina is talking about.

Mrs. GRIFFITHS. OK.

Mr. RUINA. We feel it will work just as we had planned. There is no reason to doubt this. In fact, this is one of the programs where there is very little technical risk involved at all. The radars themselves are rather conventional, it is an area where we have a lot of experience designing radars of this type. What is different in this system is that it has tremendous power. The radiated power is much greater than we have in any other radar now deployed. It will do what we expect it to do. Actually, what we expect it to do isn't quite enough, we would like to have more warning. For example, it will give us early warning only if we have a raid over the North Pole, where these things are located. If we have a ballistic missile attack that originated somewheres in the Atlantic, let's say, or in the Pacific, submarine launched, or if something is fired around the South Pole at us, the long way, four times as far, this system would not be effective.

Mrs. GRIFFITH. The last time we checked the early warning system, I think it was not effecive. What has been done since? This was about 4 years ago.

Mr. ROBACK. BMEWS, 4 years ago what was the status of it?

Mr. RUINA. It still isn't operative. The first of these sites will be working this year. We have power on the air, but it won't be operational in the true sense until later. So we don't have any capability as of this moment, but we will have some very soon.

Mrs. GRIFFITHS. And you surmise it will be effective?

Mr. RUINA. Well, we have much less doubt on this one than we have in many other programs.

Mr. ROBACK. It is conceivable that you will get a fair degree of technical assurance of a 15-minute warning time, but here is really the big problem: Suppose within that 15-minute period, 7 minutes from zero, you have a warning; what do you do?

Mr. RUINA. You mean what does SAC do?

Mr. ROBACK. What does anyone do? Who is going to say what ought to be done when, 7 minutes from zero time, you see these blips on your radar and they have been conveyed to any receiving posts; what do you do?

Mr. RUINA. Actually, the information is handled automatically. There are computers at each of these sites. The information is transferred down through the channels of NORAD and SAC to the Joint Chiefs of Staff and the President. What the President and the Joint Chiefs will do, I don't feel competent to say.

Mr. ROBACK. I didn't expect you to give an answer. [Laughter.] But I wanted to bring home the nature of the problem.

Mrs. GRIFFITHS. It can be surmised we will save the Joint Chiefs.

Mr. ROBACK. The Joint Chiefs will probably issue a split paper on the subject. [Laughter.]

BMEWS NOT INTEGRATED WITH SAGE

Mr. ROBACK. We have discussed with General Estes a little bit the withdrawal of the FAA from this communications control system. What is the problem of integrating early warning data in regard to missiles and also satellites into the SAGE system? Is the SAGE system one that is going to grow to encompass communications for this type of activity?

General ESTES. It is not, Mr. Roback. I believe Dr. Ruina can express to you what activities are under way in that regard.

Mr. ROBACK. SAGE is not related to BMEWS?

General ESTES. It is a defense against the manned bomber, not against ballistic missiles.

Mr. ROBACK. Do we have to develop a new kind of SAGE system for ballistic missile defense?

General ESTES. Well, there are certain connections that can be made very positively between any ballistic missile early warning system, whether it be MIDAS or BMEWS or whatever it is, and whatever active system is eventually developed against the ballistic missile.

You would like an eventual solution which would permit building a system which would at once warn against and immediately attack any ballistic missile fired on a trajectory that approached the United States. Nonetheless, that is some distance in the future.

Mr. ROBACK. Is it the case that you don't have the complex of defensive weapons, you don't have your Zeus, so there is no sense in having an automatic sorting and combat direction system?

General ESTES. I think that is so at the present moment. However, the need for sorting out satellites, debris, other objects in space is increasing as every day goes by and Dr. Ruina can discuss with you what we currently have under way under the Department of Defense in this regard.

It is not specifically connected with an active system, nor is its purpose exactly that. But you can appreciate the fact that there are many other reasons for wanting to know what is in space.

Mr. ROBACK. Can you tell us about the communications problem in the missile and satellite field?

Mr. RUINA. Well, I think I can add to what General Estes said, in that if the Zeus system is deployed, we will have a computational capability in this system which is equal to, if not greater than, SAGE. The computations are different and the philosophy is somewhat different. I think fundamental to the SAGE system is the tying together of different censors, feeding information from one radar site to one

command site, from different radars to the same command site, between command sites, and the like. The Zeus batteries would act autonomously.

The computation that is done is that of deciding, what is coming in and what do we do about it, are there decoys and how do we discriminate, also when to fire the missile and then, just what sort of guidance you give the missile to perform its intercept. So the computation is entirely different. But there will be, you might say, giant computers connected with Zeus.

Satellite surveillance is tied rather intimately not with our air defense against bombers, but rather with our early warning system, our BMEWS system. The type of radars that are needed are similar. For example, our BMEWS system will see all satellites that pass over the northern regions, that is if they are within a reasonable altitude.

The BMEWS computer then has to decide whether this is indeed a satellite or something to be worried about.

Now, it is very difficult to add to this capability—let me back up a little.

If it decides that it is something to worry about, then it does something about it. If it is a satellite it does nothing about it. We can provide a channel which says, "This is a satellite, give us the crude orbit information you have and let's catalog it." We are thinking in terms of how one uses the BMEWS system to complement whatever other radars we may install for satellite surveillance.

Does this answer your question?

NATO AIR DEFENSE

Mr. ROBACK. Probably sufficiently in a discussion of this nature.

Is the problem of air defense in NATO, which you said depends on several minutes' warning, complicated by the fact that you have to get the permission of each sovereign government in case you had to make a decision, say to fly airplanes, or utilize defenses?

Mr. RUINA. Well, as a citizen I would think that it would be. Actually, our office doesn't concern itself with questions of this type. We have been mostly concerned with the technical research and development problems involved, not so much the operational questions of this type.

NORAD

Mr. ROBACK. Well, this is a problem. Maybe General Estes can tell us a little bit about the relations with Canada. If you had to deploy planes across the border, do you have to get permission from the Prime Minister or his defense minister?

General ESTES. Not our defense forces. As you realize we are joined with Canada in the North American Air Defense Command. This is one of the reasons for that.

Our activity with the Canadians is such that under any situation of air defense alert, air defense aircraft pass back and forth across the border as necessary under the control of the North American Air Defense Command.

Mr. ROBACK. Well, nuclear-armed aircraft, would you have to get permission for them?

General ESTES. No; not under conditions of air defense alert.

BOMARC'S FOR CANADA

Mr. ROBACK. The Bomarc program is going to remain, as far as the Canadians are concerned; is that correct?

General ESTES. That is correct.

Mr. ROBACK. That is the Bomarc B.

General ESTES. It is as far as the Canadians are concerned.

Mr. ROBACK. Do you anticipate that the Air Force will provide any Bomarc B's for the Air Force?

General ESTES. Do I anticipate that we will? Our recommendation is that we do so.

Mr. ROBACK. You recommend that. Has the appropriations committee made some provision for the Bomarc B?

General ESTES. The appropriations committee has recommended that the Air Force recommendation not be accepted. I don't know——

Mr. ROBACK. If you don't get any Bomarc B, which is a possibility judging from the appropriations committee approach—if they don't provide funds for the Bomarc B's, you won't be able to program for them; will you?

General ESTES. We will not.

Mr. ROBACK. If you don't get any Bomarc B's, what becomes of the Canadian Bomarc B's?

General ESTES. There will be no Canadian Bomarc B's either.

Mr. ROBACK. The Canadians have dispensed with their interceptor program on the basis of having the Bomarc B available; isn't that so?

General ESTES. They have dispensed with an interceptor——

Mr. ROBACK. Excuse me, the new interceptor program.

General ESTES. I do not know the total reasons for doing so, but they have adopted the Bomarc B rather than carrying on with that particular system.

Mr. ROBACK. And the reason that they will not have any Bomarc B's, if you don't have any, is because you provide the major part of the funds for air defense weapons that Canada uses; is that not the case?

General ESTES. Partially, that is true.

Mr. ROBACK. What is the proportion?

General ESTES. On the other hand, the entire development program, all of the testing and so forth, is being carried on by the U.S. Air Force. The Canadians are totally dependent upon our own developmental effort to carry through the Bomarc B program. If the U.S. Air Force is forced to cancel its own program, then there is no means to carry on the development of the system.

COST OF BOMARC PROGRAM

Mr. ROBACK. You have invested how much in the Bomarc B to date? There is a figure in the Appropriations Committee hearings. Do you recall it?

General ESTES. I would like to call on Colonel Crowe, our budget representative.

Mr. ROBACK. He is a very efficient budget man. He has the answers to practically everything, I find.

Colonel CROWE. The total cost of the Bomarc B, through the program the Air Force has recommended is $2.2 billion. That is if we get the additional nine squadrons.

Mr. ROBACK. What is your expended or committed funds to date in the development program and testing program? Do you have that figure?

Colonel CROWE. Yes.

Mr. ROBACK. Give us just a rough figure. We don't have to refine it too much.

Colonel CROWE. Through fiscal year 1960 we will have roughly $2.1 billion.

Mr. ROBACK. Invested in the B or both Bomarcs?

Colonel CROWE. In both.

Mr. ROBACK. Do you have the B program?

Colonel CROWE. Yes. Would you pursue the question just a little further, I mean another aspect of it and I will dig this figure out for you.[1]

EFFECTS OF BOMARC B CANCELLATION

Mr. ROBACK. If the Bomarc B is washed out and the Canadian part goes with it, necessarily, can you tell us what the consequences would be as far as the North American Air Defense program is concerned? Would this break up the program?

General ESTES. Well, I can put many interpretations on your question, Mr. Roback. Do you mean vis-a-vis the relationship between the United States and Canada or do you mean what would the effects be on reduction of weapon density in air weapons or just what?

Mr. ROBACK. Put it this way: The Bomarc B in the contemplation of the Air Force was going to become the dominant weapon against manned aircraft; was it not, at one time?

General ESTES. Coupled with another system it would have been.

Mr. ROBACK. Coupled with another system. The Bomarc system was to become one of the primary air defense weapons.

General ESTES. That is correct.

Mr. ROBACK. I am talking about manned aircraft defense.

General ESTES. Correct.

Mr. ROBACK. Canada recognizing that, said, "We will not contract with our own manufacturers for this air defense plane,"—and there was quite a controversy there—and said, "We will go for the Bomarc B." And now you are dropping it, and Canada doesn't have an opportunity to get the weapon if this happens. I am asking, what is the future of the North American air defense system in the light of these possible developments.

General ESTES. I would think any remarks that I made on that would be pure conjecture, because I have no idea as to what Canadian Parliament would decide upon.

BOMARC B PART IN TOTAL AIR DEFENSE

Mr. ROBACK. Was the Bomarc B cut back because of the technical problems that have arisen or because you just think that it is not one you ought to pursue in the light of the overriding missile threat?

[1] See p. 74 below.

General Estes. As I attempted to point out in my opening statement, you cannot take one part of a total air defense system and talk about it in a vacuum, without referring to the rest of the system. The Bomarc B, as designed, would have been a component part of a total air defense system. With reference to the total system, in order to match up with what we consider the threat to be in the time period at which the total system would have been operational, there would have been many requirements which would have included not putting in the Bomarc B system as we had planned, but, rather, hardening and dispersing the Bomarc system along with further hardening of the control centers which I mentioned, et cetera.

It was our belief that to do all of these things, it would have, as I mentioned, not only increased the cost but also the time at which the total system would have become operational. Our feeling was that the cost would have been such as to result in a disproportionate amount of total overall defense posture dollars going into defense against the manned bomber, and further, we felt that the increase in time was such that the total system would not be very responsive to the true threat at that time, even though there will be still a manned bomber threat. The overall threat would have been far greater than just bomber threat alone. We therefore felt that it made sense to, in effect, eliminate the Bomarc B program and to use those dollars, today, to prepare for the threat which we truly anticipated in that time period.

By eliminating the Bomarc B program, however, I do not necessarily mean as is obvious from our recommendation that there should be no Bomarc B's. Based on the progress of the contractor to date, based on the amount of funds invested, based on termination charges, based on other ways and means by which you could gain operational capabilities for equivalent sums of money, it was our feeling that the most economical way to gain that operational capability was by the purchase of the nine squadrons of Bomarc. The amount of money actually saved in the contract, in other words, could not be as effectively employed for manned bomber defense in any other way.

MAXIMUM PLANNED BOMARCS

Mr. Roback. When is the first time that the Air Force decided that the Bomarc B should be—put it this way: What was the peak Air Force plan for the Bomarc?

General Estes. The peak plan was for 40 squadrons of 120 missiles, 4,800 missiles.

Mr. Roback. That is A and B?

General Estes. At that time there was no such thing as the B missile. There was an A, B, and C version in the program. This was 5 years ago. I refer to this as the Air Force program. It was also the NORAD, North American Air Defense-Command recommended program at the same time.

Mr. Roback. In total how many missiles?

General Estes. 4,800.

Mr. Roback. When was that cut back, or were there several cutbacks?

General Estes. The program has been revised on several occasions for a number of reasons.

In the first place, at the time of the recommendation for 40 squadrons and 4,800 missiles, the threat was very different than it it at the present moment. There was no threat other than a bomber threat. It appeared that the Russians were going to drastically increase the capabilities of their strategic bomber force. There was no ballistic missile threat. Estimates as to when there might be a ballistic missile threat were very considerably different than as eventually turned out. Therefore, the program at that time was related to our estimate of the overall military situation at that time.

CHANGES IN SQUADRONS AND SITES

Mr. ROBACK. How did the Bomarc estimate stand before the so-called master plan was developed?

What was the Bomarc program then?

General ESTES. Well, I will have to refer to several things in order to answer that question.

In the first place, as you recall, I referred to 40 squadrons of 120 missiles each. By the time of the Department of Defense master plan we had made very considerable change in what we considered a Bomarc squadron to be, the number of missiles per squadron had been drastically reduced over the original number.

With those reduced size squadrons, the Air Force program called for on the order of 32 sites for Bomarc of these reduced squadrons. The North American Air Defense Command plan, as I recall the figure stated a requirement for 36 locations, however, of squadrons larger than those that the Air Force proposed.

MASTER AIR DEFENSE PLAN-BOMARC SITES

Mr. ROBACK. The master plan was developed subsequent to a congressional request. You stated in your testimony that seemed logical, but you know there was a lot of pressure and a specific request by the Congress that this thing be shaken down, as I recall. Then you came up with a master plan. Now, what did the master plan recommend with regard to the Bomarc?

General ESTES. Sixteen locations, sir.

Mr. ROBACK. Sixteen sites. Is that a squadron a site?

General ESTES. Yes, these are of the reduced size squadron that I mentioned earlier. That is 16 squadrons in the United States plus 2 in Canada.

Mr. ROBACK. After the master plan, what did the President's budget recommend?

General ESTES. The President's budget made recommendations based on the master air defense program. In other words, the program for fiscal year 1961 would not have completed the program.

Mr. ROBACK. Total of 16 sites.

General ESTES. Total of 18; 16 in the United States.

CURRENT RECOMMENDATION FOR BOMARC SITES

Mr. ROBACK. Then you revised that program. In other words, when did you decide that the bomber threat was seriously decreasing? You made a revision after the master plan?

General ESTES. That is correct, yes.

Mr. ROBACK. How many sites did you end up with? What is your final site estimate as far as the Air Force is concerned?

General ESTES. Overall, both A's and B's, 10 sites.

Mr. ROBACK. When was this decision made, approximately?

General ESTES. The decision was made approximately March 15, let's say, roughly in the first couple of weeks of March.

BASIS OF RECOMMENDATION

Mr. ROBACK. Do you know of any reason why the bomber threat decreased around March?

General ESTES. No, sir, I do not. I don't think that you can take the implication from the statements that I have made that we drastically revised the program because all of a sudden there was some great difference in either the missile or the bomber threat. About the best way I can explain the situation, why we didn't come in earlier with our recommendations is this: You realize that there are a certain number of people available who are qualified to make studies on any program, whether it is a strategic program, an air defense program or what it is. The Chief of Staff has had us constantly looking very, very hard at our defense against manned bombers, those in the air staff who are qualified to do so, because of the constantly changing nature of the threat. Every day some new fact of one sort or another comes in, none of which is big enough in itself to cause a revision, but over the period of a year or more enough facts are gathered to indicate at least a difference in trend, for a future time period.

For these reasons, as I say, the Chief of Staff has had us making numerous studies on the relationship between offense and defense and specifically on the defense against the manned bomber.

At the time when the 1961 budget was being prepared, most of the people who were involved, who were qualified to study air defense, were involved in attempting to come up with final answers with reference to an Air Force program in response to the Department of Defense master plan. This was not even completed until December. Our final recommendations on that subject were presented to the Department of Defense in the latter part of December.

Therefore, you couldn't be studying about six different things at once. We were studying what we were going to do in response to that plan and at the same time carrying on as best we could an analysis of where we ought to be going for the 1965–66 time period in overall defense. As soon as our recommendations were complete on the master air defense plan, we then picked up in detail the studies and analyses which led to our recommendations in March.

Mr. ROBACK. Are these studies made for you by MITRE or by ADSID, so-called?

General ESTES. I am referring here, sir, entirely to air staff personnel.

DEVELOPMENT OF MASTER AIR DEFENSE PLAN

Mr. ROBACK. What was the role of ADSID, Air Defense Systems Integration Division, and MITRE, its technical contract staff, what role did they play in the master plan?

General ESTES. In the master plan, sir, I think Mr. Klotz would be better capable of answering that question for you since that was a DOD plan.

Mr. ROBACK. Who developed the master plan, Mr. Klotz?

Mr. KLOTZ. The master plan was developed by the Secretary of Defense in consultation with the Joint Chiefs of Staff, plus some of the assistants of the Secretary's own staff.

Mr. ROBACK. Did Mr. Holaday formulate the master plan?

Mr. KLOTZ. He had an input into the formulation of the master plan, that is correct.

Mr. ROBACK. Input means he had something to do with it. But how much? A big input?

Mr. KLOTZ. He had a proposal which was presented to the Secretary; the Joint Chiefs of Staff addressed themselves to that proposal. The eventual plan that was arrived at, was a variation of that original plan.

Mr. ROBACK. What responsibility did ADSID and/or MITRE have in it?

Mr. KLOTZ. I am not aware that ADSID or MITRE had an actual input to the formulation of that plan as it was presented to Congress.

Mr. ROBACK. Did they make a commentary on it?

Mr. KLOTZ. After the plan was formulated ADSID and MITRE did make a commentary on the plan. They were directing their attention to the specific technical details of the ground environment, the SAGE environment.

Mr. ROBACK. To see what readjustments perhaps might have to be made, is that the idea?

Mr. KLOTZ. That is correct. You see the master plan was directed primarily at setting force levels for the interceptors and missiles, it established in a very general way where the SAGE environment was to be in the country. Beyond that there was a need to have a very detailed plan of how the radars, how the communications, and how the data links should all be tied together.

AIR FORCE ORIGINATED CHANGES

Mr. ROBACK. In addition to the Bomarc cutbacks by the Air Force lower than those in the plan, what other changes were made—that is briefly—since the plan, the Air Force revision of the air defense program?

Mr. KLOTZ. I know of no other revisions to the master plan.

Mr. ROBACK. Did the master plan recommend that all of the supercombat centers be knocked out?

General ESTES. The master plan?

Mr. ROBACK. Yes.

General ESTES. No, sir. The supercombat centers were in the master plan.

Mr. ROBACK. Who knocked them out?

General ESTES. The Air Force.

Mr. ROBACK. That is another change. I am asking what changes were made in the Air Force revision after the master plan——

General ESTES. Reduction of Bomarc and elimination of supercombat centers.

Mr. ROBACK. What about the status of the interceptors; what did the master plan say about the interceptors and what did the Air Force do subsequently?

General ESTES. The master plan did not address itself in any large degree to the manned interceptors. The Air Force had a program at that time for manned interceptors in the NORAD, and the master plan simply repeated the Air Force program at that time.

Mr. ROBACK. You are convinced that the manned bomber threat is decreasing, but in view of the cutbacks in the Bomarc you want some more interceptors?

General ESTES. I would like to correct your statement, since you are repeating my word.

Mr. ROBACK. This was in the form of a question. I should have raised my voice at the end.

General ESTES. I have not said that I think the manned bomber threat is decreasing necessarily. I have said that in relationship to the overall threat I think that other portions of the threat are becoming dominant and are overshadowing the manned bomber threat. It will continue and if anything, in quality, may be better as time goes on.

Mr. ROBACK. The man from Mars or the man in the street sees that you are asking for more interceptors and less Bomarcs. What ought he to deduce or conclude from that?

General ESTES. The Air Force has not asked for more interceptors, sir. The Air Force in its recommendations requested that funds be authorized to improve the capabilities of our existing interceptors.

Mr. ROBACK. Haven't you asked for a complement of 106's?

General ESTES. We have not.

Mr. ROBACK. You have not recommended there be any increase in the 106's?

General ESTES. The House committee recommended that some interceptors be added to the program, having recommended that Bomarc be eliminated.

Mr. ROBACK. You mean that was their recommendation, not the Air Force's?

General ESTES. That is correct, sir.

Mr. RIEHLMAN. Was that the House Committee on Armed Services or the Appropriations Committee?

General ESTES. The Appropriations Committee, sir. I think I should amplify that, sir, by saying that during the hearings various members of the Military Appropriations Committee asked me questions as to what the Air Force would recommend in the event that Bomarc were eliminated or in the event that the Bomarc development program did not produce an operable weapon.

I stated that most probably the North American Air Defense Command would recommend additional interceptors to make up for the weapon density loss represented by loss of the Bomarc system. But there has been no distinct definitive Air Force recommendation for increased interceptors at this point.

AIR FORCE STUDY OF ARMY WEAPONS

Mr. ROBACK. General Estes, both the Army and the Air Force have important air-defense responsibilities, and the Air Force has many

more air-defense weapons; they have interceptors and Bomarcs. So you have a wide area of responsibility.

Now, has the Air Force ever entered into any contract with any agency to study the Army air-defense system? Particularly the cost of the system?

General ESTES. Well, sir, first let me say that because of the SAGE system and because of the degree to which the SAGE system ties in, in the area under the sector commander's control, all weapons, studies have been made with MITRE to find ways and means of tying the Nike-Hercules into SAGE system control. So that the SAGE sector commander can adequately give instructions to the Nike-Hercules batteries as well as to the Bomarc and fighter-interceptor squadrons.

To that extent we have definitely contracted. Now with respect to investigation of the cost of Army systems, I don't know. I might ask some of my people. Are you familiar——

Colonel SHIELEY. Not of any specific contract, no.

General ESTES. I am not familiar with any, sir.

Mr. ROBACK. Has there been any contract by the Department of Defense to study the Hercules program cost? Has there been any study by the Air Force to study the Hercules program cost?

General ESTES. Have there been any studies conducted by the Air Force?

Mr. ROBACK. Any studies conducted by the Air Force under contract or otherwise, to study the cost of Hercules?

General ESTES. None under contract that I know of. Within the Air Force, that is correct; we have made such studies.

Mr. ROBACK. If you find that your information is not fully correct, will you advise us?

General ESTES. I will be glad to do so. I am not personally familiar with such studies, at least to my knowledge none has ever been conducted in a contractual sense.

HARDENING CONCEPT FOR SUPERCOMBAT CENTERS

Mr. ROBACK. With regard to the super combat centers which have now been canceled or thrown out of the program, they were to be hardened.

General ESTES. That is correct.

Mr. ROBACK. What was the hardening criterion? Was it 30 or 100 pounds per square inch?

General ESTES. It was considerably in excess of that, sir.

Mr. ROBACK. Over a hundred?

General ESTES. Yes.

Mr. ROBACK. What is the relationship of the hardening requirements there to the hardening requirements for SAC bases?

General ESTES. None of our Strategic Air Command bomber bases and currently hardened in any respect, sir. With respect to missiles——

Mr. ROBACK. Excuse me, I mean SAC bases for missiles. That is what I had in mind. Let me rephrase the question.

What was the theory of hardening the super combat centers? Was it different from the theory of hardening the Atlas sites and the Titan sites?

General Estes. Let me take both of them separately, because the philosophy is different.

Within the ballistic missile program, as you know, our hardening program has been to provide a situation such that through dispersal of hardened missile sites, every single missile in the latter squadrons becomes a separate aiming point for any conceivable—for any conceivable enemy ballistic missile.

What this means then is that by dispersing your weapons and by setting them up in a situation such that they are not easily vulnerable to a ballistic missile attack, you present any potential enemy with a much increased deterrent to his attack, as opposed to the situation if they were all sitting on one point unhardened where he could hope to get all of the missiles with one or two of his own. Because of the relationships between warhead yield and accuracy which are estimated in the national intelligence estimate for missile capabilities in the future, by hardening our sites, our missile sites, and by dispersing them, we can create a situation where he has to have an absolutely tremendous number of missiles to have any hope of achieving any reasonable degree of damage to our retaliatory capability. Thus, a deterrent is postulated such that he probably would not attack.

On the super combat centers, since you would have had only a very limited number of these sites, each of them could have been a separate aiming point and if the enemy desired to take those centers out, it would not have cost him an extremely large number of missiles to do so.

In other words, the numbers comparison was nothing like the comparison with our own missiles, with our own retaliatory force.

In our examination of this situation we found that the hardening which we had proposed for those centers simply was not enough, based on the anticipated accuracy and warhead yield for the future of Russian missiles, to have any real assurance of their survival, if he decided he wanted to take them out.

Therefore, our opinion was that they would have had to be much harder than we had planned, without going into specific numbers, so that he would have had to devote to each of them a larger number of missiles than he would have been willing to expend. That we thought was too expensive to carry out and would have delayed the system too much as I mentioned before.

MIXED DETERRENT WEAPONS

Mr. Holifield. Have you been generally moving away from the dependence upon hardening to a dependence upon mobility?

General Estes. No; we have not.

Mr. Holifield. Looking forward to the Minuteman, and thinking of the Polaris, and thinking of the missile launched from a bomber?

General Estes. No, we have not.

There is a definite relationship between the number of missiles that one should have hardened and those that you should have mobile to achieve the best possible deterrent. Mobile systems provide you with certain distinct advantages, hardened systems provide you with cerain very distinct advantages. Therefore, within the Air Force our trend has been toward including mobile systems within the force but not toward those as the sole force, mobile systems as the sole

force. We believe that there must be a proper mixture between fixed hardened missiles and mobile missiles.

Mr. HOLIFIELD. In your fixed Atlas, Titan, and Minuteman bases, are you not setting up targets, in effect, the value of which is really deterrence?

General ESTES. The value of which is deterrence?

Mr. HOLIFIELD. Yes.

General ESTES. Very definitely; yes, sir. But also should deterrence fail they are of extreme value in retaliation or should the United States ever find itself in the position where it had to start the attack first, they are extremely valuable for that purpose.

LEVEL OF ATTACK AGAINST HARDENED BASES

Mr. HOLIFIELD. All right. When deterrence fails and when these hardened bases become subject to attack, then have you not automatically set up a target which requires megatonnage of attack which defeats your primary objective of defending the lives of the people of the United States, and automatically brings into effect the secondary destruction, through downwind radioactivity, of the peoples surrounding those bases downwind from them?

General ESTES. It is my belief, Mr. Chairman, that if we got into a war, regardless of whether we had missiles scattered around the country or not, this country would certainly be subject to attack. I can't conceive of the situation where if deterrence fails and all the missiles are at sea, for example, the enemy would fire all his missiles at sea instead of at our land targets.

Mr. HOLIFIELD. I am not suggesting that at all. I recognize that any attack upon our land bases or upon our industrial complexes would automatically involve radioactivity. But I am thinking of the difference between 1 megaton, to knock out a soft base and probably 60 megatons to knock out a hardened base. And I am thinking about the increased radioactivity from the difference between destruction of a soft target and the amount of megatonnages necessary to attack a hardened base, and the resultant increase in downwind radioactivity on the people. Therefore, my question was this: If deterrence fails, and the blow of the enemy falls on these hardened bases, is not the resultant downwind radioactivity greater than we can bear in our present condition of protection from radioactive effects?

General ESTES. Yes, sir. As you appreciate first, Mr. Chairman, you recognize that that isn't really the direction in which he would most probably go. Considering the relationship between warhead yield and accuracy, most probably all of his efforts to attack hardended bases would be expended toward improvement in accuracy rather than improvement in warhead yield. Far greater odds of magnitude of destruction can be attained by better accuracy than by increasing the warhead yield.

Furthermore, if you were going to get up into the——

Mr. HOLIFIELD. But until that degree of accuracy is arrived at and this is pinpoint accuracy you are talking about, almost, you have to compensate for that with increased megatonnages?

General ESTES. This, of course, is a matter of, per missile, how much megatons he can carry per missile. Whether he has the capability.

Mr. HOLIFIELD. And how many missiles he needs to lay down a pattern which will include the target?

General ESTES. Right.

(The following information was subsequently furnished:)

It should be noted however that for a given deterrent value, as represented by a specific number of hardened, dispersed missiles, it would be necessary to deploy many more soft, dispersed missiles. The principal value of hardening, therefore, lies in reducing the number of missiles which one must deploy to gain a desired deterrent value. While it is probably correct that an enemy would employ more megatonnage per missile sited against a hardened missile than a soft missile, it is apparent that the total megatonnage employed in an attack against a force consisting of lesser number of hardened missiles would approximate that required in an attack against a force composed of a much larger number of soft missiles. It would not therefore appear to me that, because we are hardening our missiles, we are by that action subjecting the country to any more of a fallout problem in the event of attack than would be the case if we had decided not to harden or to harden to a lesser extent.

Mr. ROBACK. A point of information on the record, General Estes. Mr. Lipscomb at the appropriations hearing, I think it was March 24, asked several questions about this hardening problem. One of the questions to General White was whether there were any plans in the Air Force to harden above 100 pounds per square inch? Now, the answer was "No." We had some testimony a week later here that was a little bit different. Can you give us an up-to-date statement on what the hardening plans are?

General ESTES. Did that question refer—I don't remember that particular question, Mr. Roback. Did that question refer to ballistic missiles, we were talking solely about missiles at that point or was this just hardening in general?

Mr. ROBACK. This referred to Atlas sites being hardened.

General ESTES. I see. Currently our plans do not contemplate a level above that.

However, we have conducted a series of studies to determine what the cost effectiveness is, if you will, of increased hardening, both on deterrence and on a comparison of what you would buy by buying more missiles, less hardened, than lesser missiles more hardened.

Now, these studies have been carried out but they have not resulted at this time in specific Air Force plans for an increase in hardening above that which has been discussed in the testimony. However, the question as to what levels of hardening we will eventually employ must obviously remain open since the level will depend on our assessment of the overall future situation.

EFFECT OF WITHDRAWAL OF RADAR PICKET SHIPS

Mr. ROBACK. What can you tell us about the withdrawal of the picket ships in the warning network?

General ESTES. You mean what the effect of that has been?

Mr. ROBACK. How many were withdrawn and why were they withdrawn?

General ESTES. That is a Navy program and I am not familiar with it. Perhaps some of the DOD representatives can answer that part of the question for you.

Mr. ROBACK. Were they withdrawing the ships in keeping with the philosophy that we are trying to get—to downgrade the manned bomber defenses?

General ESTES. I am afraid that I am not competent to answer that question, Mr. Roback. The Navy made that decision and I am not familiar with their reasons.

Mr. ROBACK. Did the Navy get permission from General Kuter to do that?

General ESTES. They would not have to get permission from him. They would tell him what their intent was. The permission would have to be obtained from the levels of the Joint Chiefs of Staff.

Mr. ROBACK. They would just add to his woes if they would tell him, is that right?

Mr. Klotz, do you have any information on that?

Mr. KLOTZ. I do not have the specific number of ships that were withdrawn.

Mr. ROBACK. Was that a unilateral decision by the Navy?

Mr. KLOTZ. It was a decision, as General Estes has indicated, that was initiated by the Navy and it was reviewed by the Joint Chiefs of Staff and submitted to the Secretary of Defense and approved by the Secretary.

Mr. ROBACK. Are there going to be cutbacks or withholding of further work on the whole warning network for the manned bomber threat?

General ESTES. No, sir.

Mr. ROBACK. Not only picket ships, but I mean DEW line and other refinements and extensions.

General ESTES. Not with reference to the DEW line or the DEW line surface extension. What the Navy's intentions are with reference to the extensions carried out from the end of the Aleutian Chain to Midway, and in the holes in the system between islands on over toward the United Kingdom, I do not know.

Mr. ROBACK. If you do not know, probably a great many people do not know, wouldn't you say?

General ESTES. I would presume the Navy must know what their intentions and plans are, sir.

Mr. KLOTZ. I would like to volunteer, sir, that the plans of the Navy and the Air Force with respect to the DEW lines are reviewed very carefully at NORAD, and within the Department of Defense and before any of these actions are taken, the net effect of any changes is very carefully assessed.

Mr. ROBACK. What I was trying to find out, Mr. Klotz, was whether this was done because the Navy was tight for money or because they didn't think the ships were needed? That is what I was trying to get at.

Do you have any observations?

Mr. KLOTZ. I don't pretend to understand completely why the Navy initiated their action. I suspect they, too, have problems of the overall balance of forces to think about. But they certainly did take account of the characteristics of the detection capability that was offered by both the airborne and seaborne part of that line. You see, there are airplanes which cover the same territory that was covered by the surface units.

FAA USE OF SAGE SYSTEM

Mr. ROBACK. General Estes, we talked earlier about the fact that the super combat centers now being withdrawn, the preliminary plans to work out with FAA a national control traffic system have to be reconsidered. Is there a program for reconsideration? Is there a new plan that has to be devised and will be devised?

General ESTES. That is correct. Already this is underway in two regards: First, in the Detroit sector at the present time the FAA and the U.S. Air Force are jointly working in the SAGE sector in that area, making use of the current SAGE facility to determine just exactly what can be done in radar control of air traffic.

Based upon the results of that on-the-spot study, using available hardware, our full plan will be further developed.

Secondly, in addition to that actual experiment in progress, we are working jointly in studies with FAA, with our action level representatives and there is joint study as to what might be done in developing the broad outlines of a plan. Those outlines will be filled in by this experiment and by work that I am under the impression that the MITRE Corp. is still doing for FAA.

Mr. ROBACK. Is a plan dependent on the acquisition of new computers, heavy duty computers?

General ESTES. I think that will have to depend, sir, on the results of the experiment that we now have going on in the Detroit sector. Further, it will have to depend upon the studies that are jointly in progress which I have just mentioned.

There are certain sections of the country which will not be covered by SAGE control, particularly in the interior of the country, in the South, South-Central parts of the country. Some type of computers will have to be procured by FAA to fill in the lack of SAGE computers in that area.

Now, whether any additional computer capability will be required by the FAA in those areas which are covered by SAGE, will be the result of the experiments and studies that I have mentioned a moment ago.

COST OF BOMARC A AND B

Mr. ROBACK. Colonel Crowe, do you have a response to a question earlier?

Colonel CROWE. Yes, I do.

Mr. ROBACK. What is it?

Colonel CROWE. As I indicated, the total cost of the program would be $2.1 to $2.2 billion. Now, as we have sorted out the figures between the A and the B, and you understand that in some instances some costs you could probably say in effect be borne jointly by the two programs. As we have them sorted out, we show for the B about 900 million, and about 1.3 for the A.

Mr. ROBACK. The A includes hardware in place?

Colonel CROWE. That is right.

COMPLETION OF SAGE

Mr. ROBACK. Do you have summary figures—they may be in the Appropriations Committee hearings, and you can advise us if they are—the summary figures on the SAGE system?

Colonel CROWE. Yes, they are in the Appropriations Committee hearings.

Mr. ROBACK. We won't pursue it here. But what construction work, actual construction work remains to be done in the SAGE system as it is now planned?

General ESTES. Will you cover that, Colonel Shieley?

Colonel SHIELEY. I will have to look that up, sir. The bulk of the construction is completed for the SAGE centers.

General ESTES. Construction, as such, actual construction of the building he is talking about.

Colonel SHIELEY. Yes, sir. Construction of the centers is just about complete. There is very little left to do.

Mr. ROBACK. That is partly because the cutbacks have eliminated some new construction.

Colonel SHIELEY. That is right, sir.

Mr. ROBACK. Of not only supercombat centers, but were some direction centers and combat centers also cut back?

Colonel CROWE. No, sir, none of them were eliminated.

General ESTES. That is not entirely correct. When we went into the supercombat center program, we eliminated some of the coverage by the old direction centers, as we refer to them, the old SAGE direction centers.

So to that extent, there has been some reduction in SAGE centers. We did this because the coverage could have been obtained in roughly the same time period by supercombat centers.

Therefore, with the SAGE direction centers and combat centers which we had been building, we continued right on with the construction of those which were to remain under the supercombat center program.

Mr. ROBACK. And you say construction is underway on all those centers?

General ESTES. Yes.

Colonel CROWE. Yes, construction is underway. The last one, as far as construction is concerned, will be completed on the 1st of September this year.

Mr. ROBACK. That will end your center construction program?

Colonel SHIELEY. That is right.

COMPLETION OF DEW LINE

Mr. ROBACK. What about your warning stations? DEW line and other line stations? Is there any construction underway or planned for those?

General ESTES. Yes. In the eastward extension of the DEW line, there is still construction that must be accomplished, all of which I believe is now in progress. Is there any part of it that isn't in progress?

Colonel SHIELEY. As far as the warning lines are concerned, the construction on those is all in progress. As far as the United States is concerned, on some checking in this country, there is some more construction required and funded in both 1961 budget and in the 1962 budget.

General ESTES. That is not DEW line.

Colonel SHIELEY. These are not the DEW line. All the DEW line and early warning construction is underway, that we planned.

Mr. ROBACK. What is the status of your radar stations, say the gap filler stations?

General ESTES. There is construction still required in the modernized radar program.

BMEWS NOT ADAPTED FOR AIRCRAFT

Mr. ROBACK. Mr. Ruina, you referred on page 2 to the significant limitations of the BMEWS system: It will not provide early warning against submarine or aircraft—I mean aircraft launched ballistic missiles—nor would it provide warning against satellites?

Mr. RUINA. The ballistic missile early warning system will detect satellites that go over the northern regions, up to altitudes of hundreds of miles. Satellites that may have altitudes higher, let's say thousands of miles, probably would not be detected and it certainly wouldn't detect satellites, let's say, in an equatorial orbit.

Mr. ROBACK. Will it detect aircraft?

Mr. RUINA. I doubt it. The way the beam is set, the ranges which it is alerted to look at, and such, it is not set to do this job at all.

DETECTION OF SUBMARINE-LAUNCHED MISSILES

Mr. ROBACK. In any event, you say the limitations are significant. They are really much more than significant; they are serious, aren't they, because of the nature of the threat? The submarine threat is, some believe, perhaps the most serious threat.

Mr. RUINA. For the very first thing we are concerned about, which is a missile from inside U.S.S.R. to the United States, the BMEWS would be adequate. As you can well understand, submarine-launched missiles and missiles that would come the other way around which requires four times the range, would be sort of a second generation threat and for these, of course, the limitations of the BMEWS are extremely serious.

Mr. ROBACK. Can you tell us anything about the work going on in that field to counter those threats?

Mr. RUINA. The most significant step is, of course, the development of MIDAS. If MIDAS works well and effectively, it will detect ballistic missiles or satellites launched anywhere.

Mr. ROBACK. On the sea as well as on land?

Mr. RUINA. On sea as well as on land.

Mr. ROBACK. You said anywhere on earth and that includes the oceans?

Mr. RUINA. That is right.

Mr. ROBACK. You stated that because of—I assume—because of the narrow or small geographic area in Europe, you don't have defense in depth like you do here, but your cutback in the air defense program here is eliminating the depth concept also, is it not, General Estes?

General ESTES. Yes, to the extent that we originally had it planned, since our original plan provided for complete coverage of the United States, whereas the present plans, since the master air defense plan from OSD, concentrated on a broad perimeter coverage. It doesn't

mean just a line immediately around the perimeter, but a depth of coverage totally around the perimeter.

Mr. ROBACK. General Holloway, do you have any observations on any of the testimony that was presented this morning?

General HOLLOWAY. I would like to make one with respect to the point you raised on MIDAS and reliability.

We feel that MIDAS, as a concept perhaps offers as reliable a system against ballistic missile attacks as so far it has been possible to devise. I would compare it, for example, to the problem of detecting somebody coming through that door [indicating], the solution being a man sitting here in this seat. As long as the man doesn't go to sleep or somebody doesn't shoot him or a parade doesn't go by outside, he is a very reliable system.

Now, the reason, in the first place, that we asked for more money to put on MIDAS, all of which was to be an acceleration of the R. & D. program, was to get some of these systems that are not working, like we would like to have them work, as was mentioned by Dr. Ruina, become more reliable to contribute to this system.

If it works, as planned, as a concept, then we do not know how any kind of an appreciable missile attack, no matter which way it is launched, or at what particular altitude of orbit, could escape its detection. And I hope this clarifies a little bit the point made that you referred to that this will be a highly reliable system.

Mr. HOLIFIELD. Of course, you are a long way from reliability in this system.

General HOLLOWAY. Within the system, itself, yes, sir, that is why we want more money to put on the R. & D. part of it.

Mr. HOLIFIELD. If you had the money for a crash program, what do you contemplate as to time period to develop a satisfactory device?

General HOLLOWAY. We have a target operational date now that we feel can be accelerated by as much as a year by what we are asking for here. The actual dates are classified, Mr. Chairman.

Mr. ROBACK. Would anybody sitting at the table put a time period on hardware to shoot down missiles? Excuse me, I might say, to shoot down satellite missiles.

General HOLLOWAY. Only a general one. I would offer the latter part of this decade, 1967 or 1968.

Mr. ROBACK. Mr. Ruina, do you have any observations?

Mr. RUINA. I would say it depends on how serious we consider the threat.

Mr. ROBACK. Yes. You know some people have speculated that the Russians might develop this capability or even have it, quickly.

Mr. RUINA. If we are seriously interested in shooting down nonmaneuvering satellites, satellites that are in free flight, I think I am a little more optimistic than General Holloway on how soon we can get this capability.

If I can just guess a date, 1964 or 1965, if we are very seriously interested in doing just that.

Mr. ROBACK. Are you here on an indefinite tour of duty, or only for a designated period?

Mr. RUINA. Well, I have plans to return to the University of Illinois.

Mr. HOLIFIELD. Gentlemen, we wish to thank you very much for your appearance here this morning and we will, with your permission, hold the record open for letters which may be necessary to clear up some point that may be ambiguous in the questions and answers part of our hearing this morning.

The subcommittee will stand adjourned.

(Whereupon, at 12:05 p.m., the subcommittee adjourned to reconvene at 10 a.m., Thursday, May 5, 1960.)

ORGANIZATION AND MANAGEMENT OF MISSILE PROGRAMS

Part III—Air Force

FRIDAY, MAY 6, 1960

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON MILITARY OPERATIONS
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met at 10 a.m., in room 1501–B, New House Office Building, Hon. Chet Holifield (chairman of the subcommittee) presiding.

Present: Representatives Chet Holifield, Martha W. Griffiths, Porter Hardy, Jr., and R. Walter Riehlman.

Also present: Herbert Roback, staff administrator; and Douglas Dahlin, staff member.

Mr. HOLIFIELD. The subcommittee will be in order.

This morning we will review the reorganization of the ballistic missile management setup in the Air Force. In last year's report, we examined in some detail the role of the Ramo-Wooldridge Corp. which subsequently merged with Thompson Products Co., and the role of Space Technology Laboratories, Inc., a wholly owned subsidiary of Thompson Ramo Wooldridge, in performing technical management services for the Air Force.

It was our view that if this relationship was to continue for the future, the corporation should become nonprofit. The Honorable Joseph V. Charyk, Under Secretary of the Air Force, will report to us today on developments in this field. He will be accompanied by Mr. Max Golden, General Counsel for the Air Force, and Gen. Bernard A. Schriever, now commanding general of the Air Research and Development Command, who had the responsibility in the Air Force for setting up Ramo-Wooldridge and its successor agency. Mr. Charyk, I am advised, has a prepared statement, so we will ask him to proceed to make his presentation.

But before he does, the Chair would like to congratulate General Schriever on his recent promotion to a post of greater responsibility.

Go ahead, Dr. Charyk.

Secretary CHARYK. Thank you, Mr. Chairman.

STATEMENT OF HON. JOSEPH V. CHARYK, UNDER SECRETARY OF THE AIR FORCE; ACCOMPANIED BY LT. GEN. B. A. SCHRIEVER, COMMANDER, AIR RESEARCH AND DEVELOPMENT COMMAND; MAX GOLDEN, GENERAL COUNSEL, U.S. AIR FORCE; COL. SAMUEL W. BISHOP, DIRECTOR OF PROCUREMENT AND PRODUCTION, BALLISTIC MISSILE CENTER; AND COL. B. L. BOATMAN, AIR RESEARCH DEVELOPMENT COMMAND

Secretary CHARYK. Mr. Chairman and members of the committee, I appreciate this opportunity to discuss, in light of current circumstances, our views on the management of the Air Force ballistic missile and space programs.

It is not my purpose today to review our present management system at length. As you know, this matter has been the subject of careful scrutiny since the inception of the ballistic missile program in 1954 when, in response to the recommendations of the Von Neumann Committee, the present management concept was conceived and implemented. We established a special development-management team within the Air Force, consisting of what is now known as the Ballistic Missile Division of the Air Research and Development Command and the Ballistic Missile Center of the Air Materiel Command.

Broad directive authority and responsibility for the entire program was assigned to the team. Systems engineering and technical direction support were obtained through contract with the Ramo-Wooldridge Corp. The corporation was able to bring together an unusually competent group of scientists, engineers, and technicians who provided the systems analysis, systems engineering, and technical direction capability necessary for the effective execution of a vast program involving a large number of associate contractors and subcontractors throughout the nation. In keeping with the highest national priority of the program, special streamlined management procedures were formulated. These included a direct link between the Ballistic Missile Division and the Office of the Secretary of the Air Force. The formulation of the Ballistic Missile Committee provided a key mechanism for prompt and effective top management decisions on all aspects of the program.

For an authoritative statement of the events which led to these actions, and the outstanding accomplishment to which they have materially contributed, I need only refer to the comprehensive inquiry conducted by this committee last year. The record of the hearings before this committee and its report provide a firm foundation for an understanding of the many problems associated with the ballistic missile development program.

The decisive test of the management of the ballistic missile program must be, as this committee has recognized, its ability to satisfy the Nation's requirement for operational strategic missiles in the shortest possible time. In his appearance before this committee last year, the Secretary of the Air Force, James H. Douglas, was able to point out the excellent status of the program. As indicated in this committee's report:

> From the performance standpoint, Ramo-Wooldridge (STL) along with BMD, can point to the fact that they "beat the clock" and surprised many experts in getting operable Atlases and Thors from factory to field in so short a period of time.

In the ensuing months, I am pleased to report, the progress of the program has continued to equal and exceed our optimistic expectations. The Atlas has achieved operational capability, within 2 months of the date originally scheduled some 5 years earlier and from 2 to 3 years ahead of the date generally believed possible by independent experts when the program was undertaken. With the firing of an Atlas missile by a SAC crew from Vandenberg Air Force Base in September 1959, an initial operational capability was demonstrated. With the diagnosis and correction of the difficulties that were encountered in the Atlas test program early last year, the technical soundness of the design has been demonstrated by a long series of successful firings. Since that point, in 21 out of 24 Atlas firings essentially all of the test objectives have been realized. This includes three missiles launched by SAC crews from Vandenberg and two missiles used as first stages in space programs. In addition, the missile has demonstrated performance capabilities, including range and accuracy far in excess of early design estimates.

Since Secretary Douglas' testimony last year, when he informed this committee that the Thor had been operationally deployed just 3 years after program initiation, three complete squadrons of Thor missiles have been turned over to the Royal Air Force and a formal operational declaration has been made by the British. A fourth squadron, which is now in place in England, will soon be formally turned over to the Royal Air Force. During 1959, 49 Thors were launched; 41 of these were completely successful and 5 partially successful. Of the 11 launched during 1960, 9 were completely successful. Thor launchings have become so routine that their successes hardly attract public attention. Furthermore, the actual performance of the Thor missiles significantly exceeds the initial design objectives.

In the case of the Titan, out of the total of 14 firings, in 9 flights essentially all of the test objectives have been realized while in 2 flights many of the test objectives were realized.

It is interesting to note that in the case of Thor the first long-range flight with closed loop guidance occurred on the 10th flight and approximately a year after the first flight attempt. In only 3 of these first 10 attempts were all test objectives achieved. Nevertheless, a year later the first military demonstration of the Thor missile was achieved and the long string of Thor successes followed. In the case of Atlas, a more complicated system than Thor, it required approximately a year and a half, and 15 flight attempts, to reach the first intercontinental-range closed loop guidance flight. But again, approximately a year later we achieved the first military demonstration of Atlas capability. In only 7 of these 15 flights were the large majority of test objectives achieved. In the case of Titan, intercontinental range with closed loop guidance was achieved in the ninth flight and about a year after the first flight. As anticipated, an intensive ground-testing program and the value of the Thor and Atlas experience permitted a streamlining of the flight test requirements to achieve specific objectives. The flight results to date give high confidence that a Titan operational date in mid-1961 is achievable.

Minuteman is, of course, in a much earlier stage of development, but we are confident that our ballistic missile experience and the ap-

plication of the maximum ground test philosophy provide a basis for confidence in the achievement of the scheduled goals. The silo firings at Edwards have been unusually successful and data indicates that Minuteman silo designs may well be able to withstand overpressures considerably in excess of the original 100 pounds per square inch design goal.

Finally, it is interesting to note that the Air Force has launched well in excess of 90 percent by weight of the space payloads in the U.S. space effort. Thor, in particular, has for more than a year been a workhorse in our national space program. It was, for example, the booster for Explorer VI, commonly known as the Paddlewheel, the booster for seven Discoverer satellites which achieved orbit, the booster for Pioneer V, the satellite recently placed into orbit around the sun, and the booster for both TIROS, the weather satellite and Transit, the navigation satellite.

These remarkable results afford ample justification for our original management concept. It has been our experience, however, that no single form of management in the area of weapon system development is entirely free from difficulty. Thus, since the outset of our relationship with Ramo-Wooldridge—and subsequently Space Technology Laboratories—we have been aware that there were several problems inherent in that relationship. Through close supervision these matters have been minimized and have not been permitted to impede program progress.

Particular forms of management are developed to meet specific situations and must, of necessity, be continuously reviewed. This committee's recent study has proven to be of great assistance in this regard. In its report this committee recorded its belief that, however justified the role originally assigned to STL or its predecessor might have been, it should not continue in the same relationship as it had in the past. It urged the complete divestiture of STL from Thompson Ramo Wooldridge, but pointed out that the Air Force must retain or acquire the vital technical and managerial resources STL provides. The report emphasizes that complete objectivity on the part of the contractor should be a primary concern of the Air Force. While it recognized that the solution to the problem was by no means clear, it concluded that, if STL is to have and to maintain an intimate future relation with the Air Force, it must be converted into a nonprofit institution. As stated in the report:

> The methods of effecting this nonprofit status are complex and would have to be the subject of careful negotiations. The legal problems are manifold and the solution will, admittedly, not be found quickly.

MILLIKAN COMMITTEE

In his letter of December 4, 1959, commenting on this committee's report, the Secretary of the Air Force noted the committee's conclusions that STL and its predecessor had made great contributions to the successful development of strategic ballistic missiles and agreed that the high degree of skills and experience within this organization must be preserved and utilized wherever they best serve the national interest. He indicated his intention to resolve any existing difficulties in such a way that the capabilities developed by STL would be pre-

served in the national interest and advised the committee that for this purpose he had established a special management study group headed by Dr. Clark B. Millikan to examine into the role of STL and to advise as to the future relationship and scope thereof.

The Millikan Committee reviewed the Air Force's management concept for ballistic missile development that had been established in 1954 to meet the problem existing at that time. It considered the desirability of continuing this method of management, as well as a return to the single weapon system contractor arrangement, or the "arsenal" approach.

The Millikan Committee concluded that it would not be desirable at this time to return to earlier methods of weapon systems management for the ballistic missile and space programs in view of the urgency of these programs, the possibility of their disruption and the proved effectiveness of the procedures employed up to this time. The Committee noted that the current management approach had worked extremely well both in terms of technical quality of the results and the speed with which missile system development had taken place.

Nevertheless, the Committee felt that it was timely to modify the existing arrangement, rather than to continue to rely on an expedient tailored to a pressing problem. It recommended that the role and mission assigned to Space Technology Laboratories be reoriented. It recognized that in the ballistic missile and space fields the Air Force would require for the foreseeable future scientific and technical assistance in the areas of advanced planning and evaluation of new ideas, "broad-brush" initial system design, technical evaluation of contractors' proposals, and technical monitoring of program progress. The Millikan Committee felt that this competence must still be furnished by a civilian contractor organization occupying a continuing relationship with the Air Force.

It recommended that the detailed planning and technical direction of specific projects, a function now being performed by STL, should eventually become the responsibility of competitive industry, either of a prime manufacturing contractor utilizing subcontractors or of a nonmanufacturing management engineering company using the associate contractor mechanism for major subsystems. The Committee also urged the Air Force to continue its efforts to develop its own capability to plan, analyze, and procure weapon systems in the ballistic missile and space areas.

The Millikan Committee recommended finally that the Air Force seek to implement these changes as rapidly as practicable, but with the recognition that care must be exercised to insure against disruption in the high priority ballistic missile programs.

Since the filing of your committee's report on September 2, 1959, and the receipt of the Management Study Committee's report on January 29, 1960, this matter has been under intensive study by the Air Force. Numerous discussions have been held with the management of Thompson Ramo Wooldridge and Space Technology Laboratories. A plan of action has been agreed upon which we have every reason to believe will result in the least possible disruption to our important missile and space programs.

NEW CORPORATION

The plan which has been evolved calls for the formation of a new nonprofit corporation which will provide the desired technical support to the Air Force's ballistic missile and space programs for the foreseeable future. Functions appropriate to the new organization, which have been handled by Space Technology Laboratories up to the present time, will be transferred to the new organization as expeditiously as possible. It is anticipated that a nucleus of personnel from Space Technology Laboratories will provide the initial technical skills required by the new corporation.

In order to avoid any possible disruption of the approved development plans, Space Technology Laboratories will retain detailed systems engineering and technical direction responsibility for Atlas, Titan, and Minuteman. The present restrictions imposed on Space Technology Laboratories and Thompson Ramo Wooldridge in regard to competition for hardware contracts arising directly from these projects will be maintained. Space Technology Laboratories will also retain certain experimental space projects presently under contract and due to be completed in the near future.

Functions to be assumed by the new corporation under Air Force program management include advanced systems analysis and planning, research and experimentation, initial systems engineering, initial technical direction, and technical monitoring in the field of ballistic missiles and space systems. In addition, the new corporation will provide technical staff assistance in the evaluation of ideas and proposals submitted by private industry. We believe the new corporation will furnish the technical competence necessary to assist the Air Force in effectively managing its missile and space programs.

The proposed nonprofit corporation will work closely with the Air Force in long-range planning, systems analysis, and systems comparison studies. As technical adviser to the Air Force, it will review ideas and concepts generated throughout the industry and Government in order to insure the proper interaction between military requirements and technical capabilities. This detailed analysis, together with appropriate supporting experimentation, will provide the soundest possible basis for the initial engineering specifications of a system, including the subsystems requirements, specifications, interactions, and interfaces. This initial systems engineering work will provide the basis for requests for proposals to the industry. The new corporation will also play an important role in the evaluation of the resultant proposals, and so provide the Air Force with the best technical assistance for the selection of the contractor who will have responsibility for the detailed systems engineering and the major subsystems or associate contractors. After the contractors have been selected and the development program launched, the new corporation, through technical review, monitoring, and analysis will serve to insure that technical deficiencies and weaknesses are isolated and that the impact of new data, new developments, and modified requirements on the total systems concept is properly assessed and that, accordingly, appropriate changes are introduced as promptly as possible.

It should be recognized that the corporation's role in an actual development program will be that of a monitor and technical adviser to the Air Force as contrasted to the line position of the system

contractor. This is also in contrast to the present situation where Space Technology Laboratories has a line system engineering responsibility and where, therefore, there is a requirement for detailed systems engineering and technical direction. Special cases may, of course, arise where assumption of systems engineering and technical direction functions by the new corporation may be required by the Air Force. This, however, would be an exception to the normal procedure which is proposed.

It is our judgment that the new nonprofit corporation, with the functions I have outlined, will fulfill our requirements for technical assistance, while at the same time eliminating those features of the present management system with which we have been concerned.

We feel strongly, as did this committee and the Millikan committee, that the organization we propose must possess the highest level of technical competence. We are, therefore, in the execution of the plan, giving prime attention to insuring that the technical quality required will be attracted and retained by the new organization. The details of corporate structure, organization, and staffing are now being formulated and will be announced at the appropriate time.

It is our strong conviction that the management system in operation up to this time has been a most effective answer to this country's critical need for an early ballistic missile capability. We are convinced that the new plan, carefully implemented, will similarly meet the challenges of the missile and space programs that lie ahead.

Thank you, Mr. Chairman.

Mr. HOLIFIELD. Thank you, Dr. Charyk.

At this time the Chair would like to announce that we have invited Congressman Porter Hardy to sit with this committee. He is a member of the full committee and he is also a member of the Armed Services Committee, both of which are interested in this very important problem. So the Chair has felt that it was fitting that Mr. Hardy should sit with the subcommittee, with the full privilege of questioning and discussion of this important matter.

Mr. Hardy, we are happy to have you with us this morning.

Mr. HARDY. Thank you, Mr. Chairman.

Mr. HOLIFIELD. The method of procedure this morning will be for the staff, who have been studying this proposal, to proceed with the examination. Any member of the committee, including Mr. Hardy, may feel free to interrupt at any time or to pursue a line of questioning which is deemed to be pertinent.

Mr. Roback.

Mr. ROBACK. Mr. Charyk, we always ask whether the witness prefers to be called doctor or mister. Is it all right to be called mister?

Secretary CHARYK. It doesn't make a bit of difference.

FIRST DISCUSSION OF NEW CORPORATION

Mr. ROBACK. When was the STL first examined from the standpoint of a new organization; that is, when did you consider what the future organization would be?

Secretary CHARYK. I believe it would be fair to say that as we conducted our discussions internally in the Air Force with the Millikan Committee, with Space Technology Laboratories and Thompson

Ramo Woolridge, it became clear that this might be a proper answer to the problem, and at the same time it would eliminate many of the problems that would be involved in other solutions that had been suggested at one time or other.

Mr. ROBACK. When and where did the problem first get formal attention?

Secretary CHARYK. Well, in the first place, the question of the relationships between Ramo-Wooldridge, the Air Force and subsequently Space Technology Laboratories and the Air Force has been in a sense a matter of continuing study.

I would say that beginning last summer, at the time that the committee held its hearings and with the receipt of the Committee's report that detailed considerations of the problem were initiated. As I indicated in my statement, the advice of the Millikan Committee was also solicited, and upon the receipt of the Millikan Committee report we then proceeded to try to come up with a solution to this problem.

MILLIKAN COMMITTEE REPORT

Mr. HOLIFIELD. Could you give us at this time the composition of the Millikan Committee, also where the members were drawn from?

Secretary CHARYK. We can submit for the record a copy of the Millikan report and list of members of the Committee. I have a list here, if you would like me to read it at this time.

(The document referred to is as follows:)

GUGGENHEIM AERONAUTICAL LABORATORY,
CALIFORNIA INSTITUTE OF TECHNOLOGY,
Pasadena, Calif., January 29, 1960.

Hon. DUDLEY C. SHARP,
Secretary of the Air Force,
Washington, D.C.

DEAR MR. SECRETARY: Attached is the final report of your Management Study Committee. It is my understanding that this completes the activities of the committee.

Sincerely,

CLARK B. MILLIKAN, *Director.*

REPORT OF THE SECRETARY OF THE AIR FORCE MANAGEMENT STUDY COMMITTEE

I. INTRODUCTION AND GENERAL REMARKS

The Committee has reviewed the management of the Air Force ballistic missile and space systems programs, as requested by the Secretary of the Air Force in his letter of September 3, 1959. The Committee examined the high priority projects on which Space Technology Laboratories (STL), or its predecessor company, Ramo-Wooldridge (R–W), set the pattern of technical development, performed systems engineering, and provided technical direction. Attention was focused on the unique management approach represented by the creation of the AFBMD/BMC/SAC Mike/STL complex and its relationship with the Air Force and industry in the management of advanced and complicated weapons systems. The Committee sought to evaluate the positive and negative aspects of this relationship and to determine the extent to which it might fulfill the longer term needs of the Air Force. In its deliberations, the Committee heard the views of senior governmental and industry personnel, including the Associate Administrator of National Aeronautics and Space Administration, the commanders of Air Materiel Command and Air Research and Development Command, executives of major weapons systems prime contractors and subcontractors, and officers of STL and Thompson Ramo Wooldridge (TRW). Also, recognizing the fact that the Air Force had appointed another committee, of senior Air Force officers, to consider the broader problem of over-

all management of weapons systems in general, the Committee limited its effort to studying the development management phase of the Air Force ballistic missile and space systems programs. (See appendixes A and B for Committee Membership and schedule of meetings.)

II. FINDINGS

1. The present management scheme for ballistic missile development, particularly as it involves STL's role as a civilian adviser and agent for the Air Force, was created in 1954 to meet a particular situation. It stemmed from the realization that neither industry nor the Air Force then had sufficient inhouse competence to undertake broad technical management of ballistic missile weapons systems, and from the urgency of the military situation which called for strong measures to expedite the program. (See appendix C for historical summary.)

2. The Air Force response to the recommendations of the Strategic Missiles Evaluation Committee, dated February 10, 1954, was rapid, well thought out, and effective. An unusually competent group of scientists and engineers, capable of making systems analyses, supervising the research phases and controlling the experimental and hardware phases of the ICBM program, was quickly assembled from universities, industry, and research laboratories within the Ramo-Wooldridge Corp.

The consolidation of authority for technical and procurement decision in the Western Development Division, and its location adjacent to R–W (STL), accelerated decisions at working levels. The Ballistic Missile Committees (established on recommendation of the Gillette committee) provided rapid coordination through the Department of Defense level and insulated the program from influences which might have retarded it. The priority given these projects by the National Security Council and the Department of Defense assured adequate and timely funding and facilities.

3. It is generally conceded and is the conviction of this Committee, that this management device has worked extremely well, both in terms of the technical quality of the results and the speed with which missile system development has taken place. The rapid achievement of operational status in the Thor and Atlas programs is tangible evidence of the outstanding results attained.

4. Since 1954 there have, however, been a number of changes which suggest a review of the original plan. These include, for example, the achievement of the first operational capability in the ICBM field, indicating that emphasis should now be placed on the establishment of continuing management institutions rather than on an expedient tailored to a pressing problem. Further, industry competence has greatly increased, and a number of companies now appear fully capable of managing the development of weapons systems of comparable advancement and complexity. On the other hand, the Air Force's "inhouse" capability to plan, analyze, and procure weapons of this complexity, while it has increased substantially, has not yet reached a point where the Air Force can direct the development of such systems without contractual assistance having high scientific and technical competence.

5. In numbers of technical personnel employed, size and type of facilities and expansion of its field of interest and activity, STL has grown far beyond what was originally contemplated for it. This growth, most rapid in the last 2 or 3 years, is continuing and appears to be encouraged, or at least tolerated, by the Air Force. It has been contributed to in part by the utilization of the STL organization as an available and effective instrument for tasks outside its primary area. It is the basis of widespread concern that an Air Force "arsenal" for the development and production of advanced weapons could result.

This undefined growth and uncertainty as to total purpose appear to be beginning to adversely affect STL's ability to perform its essential functions with maximum effectiveness. Its continued operation as presently constituted could tend to restrict the free flow and competition of technical ideas, thereby denying to the Air Force fully effective access to available technical resources of the Nation.

III. RECOMMENDATIONS

1. It has been suggested that the Air Force might wish to return to earlier methods of weapons system management. The Committee has considered this possibility and has come to the conclusion that it is not desirable to make any such overall return in the large ballistic missile and military space programs.

The urgency of many of these programs is still too great to allow the disruptions which could follow such a move. Moreover, in any case, the proved effectiveness of the present management plan is, for certain projects, an asset which should be conserved if at all possible.

2. A reorientation of the role and the mission currently assigned to STL is urgently required in order to preserve its capacity to perform its essential functions and assign to industry and other agencies those functions which can be performed by them. This should be programed immediately and implemented as rapidly as practicable.

3. The Air Force will require for the foreseeable future scientific and technical assistance in the following areas of the large ballistic missile and military space fields:

a. Advanced planning and evaluation of new ideas.
b. "Broad-brush," initial system design.
c. Technical evaluation of contractors' proposals.
d. Technical monitoring of program progress.

In order to have the requisite top level competence this must be furnished by a civilian contractor organization occupying a privileged and continuing position with the Air Force. This organization must be basically noncompetitive. ("Competition" in this fast moving field must be taken to apply to experimental systems and new technical approaches as well as to production hardware.) Recognizing that the monitoring function will inevitably tend toward considerable involvement in details of current programs, the Air Force will need to remain continuously alert to the problems of growth control and of possible excessive direction of contractors.

4. Detailed planning and technical direction of specific projects should eventually be the responsibility of competitive industry, either of a prime manufacturing contractor utilizing subcontractors, or of a nonmanufacturing management engineering company, using the associate contractor mechanism for major subsystems.

5. All projects, functions, or other work assignments currently performed by STL should be identified and budgeted. Those which do not conform to the criteria set forth above should be terminated, phased out, or transferred on a planned basis as rapidly as possible. In transferring such projects special consideration should be given to those contractors and subcontractors engaged in the program who have performed well. The committee believes that it should be possible to transfer to industrial weapon systems contractors the complete responsibility for the management of Thor and Atlas projects in the near future, but that such transfer of Titan and Minuteman and current satellite projects cannot, in all probability, be made for some time.

6. The Air Force should continue to develop its own "inhouse" capability to plan, analyze, and procure, weapons systems in the ballistic missile and military space areas.

7. The Committee was made sharply aware that the rapidity with which weapons technology is expanding and the continued competitive threats which face the Nation call for a continuation of the alert, aggressive, and highly responsive attitude which the Air Force demonstrated in meeting the ICBM challenge. It must continue to be receptive to unusual or unorthodox procedures when emergency situations can best be met by them.

Appendix A. List of Committee Members

Prof. Clark B. Millikan (chairman), California Institute of Technology.
Dr. Hendrik W. Bode, Bell Telephone Laboratories.
Malcolm P. Ferguson, Bendix Aviation Corp.
Robert L. Hamill, Sanderson & Porter.
Dr. Laurence A. Hyland, Hughes Aircraft Co.
Hon. Roger Lewis, Pan American World Airways.
Gen. Charles A. Lindbergh.
Gen. James McCormack, Massachusetts Institute of Technology.
Prof. Jerome B. Wiesner, Massachusetts Institute of Technology.
Maj. George G. Troutman (Secretary), U.S. Air Force.

(Dr. Emanuel Piore, International Business Machines Corp., resigned membership in November 1959 due to personal reasons. Mr. Hamill was unable to participate in the committee's last meeting and final report preparation due to serious illness.)

Appendix B. Schedule of Meetings

1. October 7, 1959. First meeting, the Pentagon. Discussions with senior Air Force officials.
2. October 22, 1959. Informal meeting in Culver City, Calif., between Drs. Millikan and Hyland and officials of Aerojet General and Rocketdyne.
3. October 29, 1959. Second meeting, New York City. Discussions with Dr. C. Stark Draper, of MIT, and senior officials of the Burroughs Corp., Avco, General Electric, and Remington-Rand UNIVAC. (This meeting chaired by Mr. Lewis in the absence of Dr. Millikan.)
4. November 5, 6, 1959. Third meeting, Santa Monica, Calif. Discussions with senior officers of AMC and AFBMD/BMC, and with senior officials of Thompson Ramo Wooldridge, Space Technology Laboratories, Martin Corp., Convair, Lockheed Aircraft, Boeing Aircraft, Douglas Aircraft, and RAND.
5. December 3, 4, 1959. Fourth meeting, the Pentagon. Discussions with senior officials from NASA and ARDC; deliberations in executive session.
6. December 22, 1959. Fifth meeting, New York City. Deliberations in executive session.
7. January 12, 1960. Sixth meeting, the Pentagon. Discussions with Deputy Secretary of Defense, Secretary of the Air Force, Assistant Secretary of the Air Force (Research and Development), Air Force General Counsel; deliberations in executive session.

Appendix C. History of the Origin of the AFBMD/STL Complex

The AFBMD management complex is a direct outgrowth of the February 10, 1954, Von Neumann Strategic Missiles Evaluation Committee findings and recommendations. Important excerpts from this report are:

Part IV, paragraph 1: "* * * it is the conviction of the Committee that a radical reorganization of the IBMS project considerably transcending the Convair framework is required if a militarily useful vehicle is to be had within a reasonable span of time. Specifically, the Committee believes that the design must be based on a new and comprehensive weapons systems study, together with a thoroughgoing exploration of alternative approaches to several critical phases of the problem, adequately based on fundamental science. * * * new IBMS development group, which we propose should be given directive responbility for the entire project."

Paragraph 2: "* * * However, the Committee expects that the new group referred to above will within a year be in a position to recommend in full detail a redirected, expanded, and accelerated program * * *."

Paragraph 6: "The most urgent and immediate need in the IBMS program is the setting up of the above-mentioned new IBMS development-management agency for the entire program, including the Convair effort. This program can then be subsequently extended and accelerated in some optimum manner to be determined by the studies of this new group. The setting up of various parallel projects as required will then also follow. The nature of the task for this new agency requires that overall technical direction be in the hands of an unusually competent group of scientists and engineers capable of making systems analyses, supervising the research phases, and completely controlling the experimental and hardware phases of the program—the present one as well as the subsequent ones that will have to be initiated. The type of directorial team needed is of the caliber and strength that may require the creation of a special group by a 'drafting' operation performed by the highest-level Government executives on university, industry, and Government organizations."

The Strategic Missiles Evaluation Committee findings and recommendations pertaining to the Atlas program were approved by the Secretary of the Air Force on March 19, 1954. Likewise, on March 23, 1954, the Chief of Staff, USAF, approved the recommendations that (1) "The B–65 (Atlas) program be reoriented so as to achieve the early establishment of an optimum intercontinental ballistic missile system"; and (2) "The field responsibility for initiating the establishment of this system be assigned to the commander, Air Research and Development Command, and he be directed to establish within his organization a military-civilian group with the highest possible technical competence in this field. This group should be able within a year to recommend in full detail a redirected, expanded, and accelerated program."

Headquarters, U.S. Air Force action on this matter was published by letter directive dated June 21, 1954, Subject: (Uncl) Project Atlas. Excerpts from this letter follow:

Paragraph 2: "* * * The Atlas program will be reoriented and accelerated to the maximum extent that technological development will permit."

Paragraph 2. e: "The ARDC will establish a field office on the west coast with a general officer in command having authority and control of all aspects of the program. This responsibility will include the development of recommended operational, logistic, and personnel concepts."

The west coast field office was established with operating elements of Headquarters, ARDC and AMC in Inglewood, Calif., on July 1, 1954. The initial authority and responsibilities of the field office commander were spelled out in a memorandum dated July 29, 1954, from Lt. Gen. Thomas S. Power, Commander, ARDC, to Brig. Gen. B. A. Schriever.

The Atlas Scientific Advisory Committee, chaired by Prof. John von Neumann, met in Los Angeles on July 20–21, 1954, to discuss additional ways and means of reorienting and accelerating the Atlas program. In addition to considering technical aspects of the program, the Committee reviewed the recommended field office organization and the proposed assignment of responsibilities to the field office civilian staff (proposed to be the Ramo-Wooldridge Corp.) and to the industrial contractors. The Committee was unanimously opposed to the recommended field office organization and proposed assignment of responsibilities presented at that time. They felt that no aircraft company was strong enough in scientific-technical depth or experience to successfully discharge systems responsibility for the ICBM. The Committee recommended the field office organization be studied further and that systems responsibility be either clearly assigned to the field office or to some organization other than an aircraft company. This recommendation of the Committee was endorsed by Mr. Quarles, who was present throughout the meeting. Mr. Quarles stated that Ramo-Wooldridge must either be a small technical staff of the Air Force and systems responsibility must be assigned to the airframe contractor, or Ramo-Wooldridge must be placed in a line position and assigned systems engineering and technical direction responsibility. In the latter case, Ramo-Wooldridge could not be a small staff but should be whatever size should turn out to be necessary in carrying out the program in the most expeditious manner.

Following this meeting, General Power, who was also in attendance, directed the commander, Western Development Division, to restudy the role of Ramo-Wooldridge and the airframe contractor in the Air Force ballistic missile program, and to submit to him recommendations on the management organization. This study entitled "A Study of the Development Management Organization for the Atlas Program," was completed on August 18, 1954. Following is an excerpt of a message, dated August 24, 1954, from commander, AFBMD, to commander, ARDC, indicating results of the study:

"Part 2. Based on study of development-management organization for the Atlas program, it is recommended that Ramo-Wooldridge, working directly for the USAF 'West Coast Office' (Western Development Division, Headquarters, ARDC, plus Special Aircraft Project Office–AMC), be made responsible for technical direction and systems engineering for the IBMS program. Ramo-Wooldridge would remain ineligible as at present for development and production of the missile or any of its components. Reasons follow:

"*a.* A clear line of responsibility and authority for technical direction and engineering decision is established. Further, the Scientific Advisory Committee strongly feels that old-line aircraft companies would find it difficult to attract topflight scientists and therefore scientific and technical competence could be established only at the expense of time.

"*b.* Convair and other aircraft companies have workloads which will detract from the quality and quantity of technical competence necessary for Atlas.

"*c.* Ramo-Wooldridge, being a new organization without IBMS production and sales motive, presents a unique opportunity for the USAF. It provides technical objectivity and great organizational flexibility for integration with the Air Force 'West Coast Field Office.' On past record its chief executives have proven their competence in technical management of complex systems and currently demonstrate capability to attract topflight scientific and engineering talent.

"*d.* Summarizing, the recommended approach appears best suited to meet the extraordinary technical problems and time goals established since:

"(1) Militarily, policy decisions, operational considerations, contract administration and broad management control will remain with the USAF. At the

same time, Ramo-Wooldridge can provide great flexibility in organizational arrangement, relationships, and procedures.

"(2) Industrially, a broad participation will be provided through the utilization of associate contractors.

"(3) Scientifically, provision of a topflight system engineering capability insures the support of the scientific group. A number of eminent scientists have voiced enthusiasm to participate.

"*c.* In conclusion, the recommended approach has the widest area of agreement from the military, the scientist, and industry."

The study was approved by the commanders of Air Materiel Command and Air Research and Development Command on September 3, 1954, wherein it was recommended to the Assistant Secretary of the Air Force, Materiel, that Ramo-Wooldridge (in the chain of technical control) have systems engineering responsibility for the Atlas program. This course of action was approved by the Assistant Secretary of the Air Force, Materiel, on September 8, 1954.

On September 8, 1955, the Atlas program was assigned highest national priority. The attainment of an initial operating capability was directed to be limited only by technology. On September 17, 1955, the Secretary of the Air Force was directed by the Secretary of Defense to—

a. Prosecute within his assigned responsibilities the ICBM research and development program with maximum urgency, and

b. Recommend to the Secretary of Defense such additional actions or administrative arrangements as he considers necessary on the part of the Secretary of Defense to implement this (the Secretary of the Air Force's responsibility), and

c. Keep the Secretary of Defense currently informed on the progress of the program.

In response to this directive, an Air Force plan for simplifying administrative procedures for the ballistic missile program, dated October 21, 1955, called the Gillette Committee Plan, was prepared. The Secretary of Defense approved the Gillette Committee Plan on November 8, 1955, and directed its implementation. This same directive included the development of an Air Force land-based IRBM on a coequal priority basis with the ICBM.

Mr. HOLIFIELD. We have a copy of the report, but I thought you might state for the record the men who composed that Committee.

Secretary CHARYK. I would be glad to do that, Mr. Chairman. The Chairman of the Committee was Dr. Clark B. Millikan, of the California Institute of Technology; the members of the Committee were Dr. Hendrik W. Bode, of the Bell Telephone Laboratories; Mr. Malcolm P. Ferguson, of Bendix Aviation; Mr. Robert L. Hamill, of Sanderson & Porter; Dr. Laurence A. Hyland, of Hughes Aircraft; Mr. Roger Lewis, of Pan American Airways; Gen. Charles A. Lindbergh; Gen. James McCormack, vice president of Massachusetts Institute of Technology; Prof. J. B. Wiesner, of Massachusetts Institute of Technology.

I might also add that Dr. Piore of International Business Machines Corp. joined the Committee, but for personal reasons was forced to withdraw in November and before the Committee had completed its report.

Mr. HOLIFIELD. Do you consider this Committee highly competent to study this matter?

Secretary CHARYK. We feel that the membership was such as to insure the sound type of advice that was necessary. Furthermore, many of the members of the Committee had been members of the original Von Neumann Committee, so that they had the additional advantage of being familiar with the problem from its inception.

Mr. HARDY. May I ask a question in that connection, Mr. Chairman?

Mr. HOLIFIELD. Yes.

STAFF FOR MILLIKAN COMMITTEE

Mr. HARDY. This is a very impressive group of people that served on this Committee. Could you tell the committee just exactly who provided the staff work for this Committee?

Secretary CHARYK. The staff work, as such, was provided by an Air Force officer, Major Troutman, who acted as a secretary to the Committee.

Mr. HARDY. Could we have a complete list of the personnel assigned for staff duties on behalf of the Millikan Committee?

Secretary CHARYK. I think basically this amounted to one man, Major Troutman.

Mr. HARDY. One man. He did all the staff work for them?

Secretary CHARYK. These duties could, I think, be more properly described as the housekeeping duties or the secretarial work associated with the Committee's activities.

MEETINGS OF MILLIKAN COMMITTEE

Mr. HARDY. They must have had somebody to advise them in detail concerning the actual operations of STL?

Secretary CHARYK. I might say that this was handled through a series of briefings and visits by the complete Committee.

Mr. HARDY. Now we are getting down to the meat in the coconut. I would like to know, Mr. Chairman, if they can't provide it now, I would like to have it provided, just exactly who gave these briefings, with specific reference to the individuals and their Air Force assignments.

Secretary CHARYK. I would be happy to do that, Mr. Hardy.

Mr. HARDY. Could I make another inquiry? To what extent did Dr. Wooldridge or Dr. Ramo participate in the deliberations of this Committee?

Secretary CHARYK. Perhaps I could run through the list of meetings that the Committee held, the people that they talked with. I think this might answer your question.

Mr. HARDY. I think we are going to need to know that. I am particularly interested in that because of your reference to the Von Neumann Committee and the fact that there was some background of experience of the people on this Committee with the Von Neumann Committee. I believe, in the case of that Committee, which initially proposed the arrangements from which STL grew, I believe that is correct, Dr. Ramo and Dr. Wooldridge both participated in the deliberations of that Committee, and according to the report of this Committee, actually, for all intents and purposes, served as members of that original Committee. I believe that is correct.

Secretary CHARYK. Perhaps I might clarify the point by quickly running through the various meetings that the Committee held and the people with whom they discussed the problem.

The first meeting of the Committee was held in early October, in the Pentagon, at which time the problem was presented by the Secretary of the Air Force and by other senior officials in the Air Force.

Mr. HARDY. Could we get a list of those?

Secretary CHARYK. I will try to recall that. I was present, General Schriever was present——

Mr. HARDY. I wouldn't want to tax your memory on that, Mr. Secretary, but I do think——

Secretary CHARYK. I will provide the complete list.

Mr. HARDY. Thank you.

Secretary CHARYK. Later in October the Committee met in California or rather certain members of the Committee met in California and had discussions with officials of Aerojet General and Rocketdyne, who are major contractors in the program. A second meeting was held in New York City; discussions were held with Dr. Draper of the MIT, and senior officials of the Burroughs Corp., AVCO, General Electric, Remington Rand-Univac, who are all contractors in the ballistic missile program.

A third meeting was held in Santa Monica; discussions were held with senior officers of the Air Materiel Command and the Ballistic Missile Division and Ballistic Missile Center and with senior officials of Thompson Ramo Wooldridge, of the Space Technology Laboratories, officials of the Martin Co., Convair, Lockheed, Boeing, Douglas, and the Rand Corp.

In early December, a fourth meeting was held in Washington with senior officials from the National Aeronautics and Space Administration and the Air Research and Development Command.

The Committee then held an executive session in New York, in late December. In early January a sixth meeting took place at the Pentagon. Discussions were held with the Deputy Secretary of Defense, Secretary of the Air Force, Assistant Secretary of the Air Force for Research and Development, and the Air Force General Counsel. Subsequent to that meeting, the Committee proceeded to draft its final report.

(The following information was subsequently provided:)

1. The first meeting was held at the Pentagon, October 7, 1959. Meeting with the committee were:

Hon. James H. Douglas, Jr., Secretary of the Air Force.
Hon. J. V. Charyk, Assistant Secretary of the Air Force (R. & D.)
Lt. Gen. B. A. Schriever, Commander, ARDC.
Lt. Gen. R. C. Wilson, Deputy, Chief of Staff, Development.
Maj. Gen. B. I. Funk, Commander, BMC (AMC).
Maj. Gen. O. J. Ritland, Commander, AFBMD.
Brig. Gen. C. H. Terhune, Vice Commander, AFBMD.
Col. B. L. Boatman, ARDC HQS.
Col. Vincent Ford, ARDC HQS.
Col. S. W. Bishop, BMC (AMC).

2. The second meeting was held at 2 Park Avenue, New York City, on October 29, 1959. Meeting with the committee were:

(a) Dr. C. Starke Draper, Massachusetts Institute of Technology.
(b) Officials of the Burroughs Corp.:
Mr. R. R. Eppert, president.
Mr. Paul Mirabito, general manager of defense organization.
Dr. I. Travis, vice president, research and engineering.
(c) Mr. James Kerr, vice president of AVCO.
(d) Officials of the General Electric Corp.:
Mr. C. W. LaPierre, executive vice president.
Dr. George Haller, vice president and general manager of defense electronics division.
(e) Officials of Remington Rand-UNIVAC:
Mr. J. W. Schnackel, vice president and general manager of UNIVAC division.
Mr. Robert E. MacDonald, general manager, military division.
Dr. Howard Engstrom, executive assistant to Mr. Schnackel.
Mr. J. Redding, director, military applications.

3. The third meeting was held at the RAND Corp. in Santa Monica, Calif., November 5 and 6, 1959. Meeting with the committee were:

(*a*) Officials of the AFBMD and BMC:
Maj. Gen. O. J. Ritland.
Maj. Gen. B. I. Funk.
Brig. Gen. C. H. Terhune, Jr.
Col. J. W. O'Neill.
Col. R. D. Curtin.
Col. S. W. Bishop.

(*b*) Officials of Thompson Ramo Wooldridge:
Mr. Dave Wright, chairman of the board.
Dr. Simon Ramo, executive vice president.

(*c*) Officials of the Space Technology Laboratories:
Gen. James H. Doolittle, chairman of the board.
Dr. L. G. Dunn, president.
Dr. R. F. Mettler, executive vice president.
Mr. F. W. Hesse, vice president, administration.

(*d*) Mr. W. G. Purdy, director advanced programs of the Martin Corp. (Denver division).

(*e*) Officials of Convair:
Mr. James Dempsey, vice president and manager, astronautics division.
Mr. Elmer Wohl, vice president, planning.

(*f*) Officials of the Air Materiel Command:
Gen. Samuel Anderson, Commander.
Maj. Gen. W. A. Davis, Director of Procurement and Production.

(*g*) Officials of Lockheed Aircraft:
Mr. H. L. Hibbard, senior vice president.
Mr. Eugene Root, group vice president, missiles and electronics.
Mr. W. M. Hawkins, assistant general manager, missiles space division.

(*h*) Officials of Boeing Aircraft:
Mr. E. C. Wells, vice president, engineering.
Mr. T. A. Wilson, manager, Minuteman program.
Mr. Ben Cohn, Los Angeles engineering representatives.

(*i*) Officials of Douglas Aircraft:
Mr. D. W. Douglas, Jr., president.
Mr. Charles Abel, vice president, defense programs.
Mr. Elmer Wheaton, vice president, engineering.

(*j*) Mr. F. R. Collbohm, president, Rand Corp.

4. The fourth meeting was held at the Pentagon, December 3 and 4, 1959. Meeting with the committee were:
Lt. Gen. B. A. Schriever, Commander, ARDC.
Col. S. W. Bishop, BMC (AMC).
Col. R. K. Jacobsen, Hq ARDC.
Hon. Richard E. Horner, Associate Administrator, National Aeronautics and Space Administration.

In addition to meeting with these gentlemen, the committee had deliberations in executive sessions.

5. The fifth meeting was held in the Chrysler Building in New York City, December 22, 1959. This meeting was entirely in executive session.

6. The sixth and final meeting was held in the Pentagon, January 12, 1960. Meeting with the committee were:
Hon. Dudley C. Sharp, Secretary of the Air Force.
Hon. J. V. Charyk, Assistant Secretary of the Air Force (R. & D.).
Mr. Max Golden, Air Force General Counsel.
Hon James H. Douglas, Deputy Secretary of Defense.

Deliberations also held in executive session.

Mr. HARDY. Mr. Chairman, I didn't mean to get you off the line of questioning, but I do think it is important that we develop this particular subject matter somewhere along the line. And from my point of view I would be interested in some detailed knowledge of actually what took place in these meetings from the standpoint of a determination as to the extent to which the members of this Commit-

tee personally participated and developed the facts which they used for the basis of their recommendation.

Now, I know how these things operate so often. I know sometimes we set up committees in Government that are given specified ground rules, and to all intents and purposes their conclusions could very well be determined before they ever start out. I know also that frequently we have committees that are established that actually reflect only the views of the staff people that perform their work for them. I don't know whether that happened in this case or not. I would be interested in knowing, though, before this thing becomes effective.

Secretary CHARYK. I think I might just add that from my personal experience with the Committee, this was an unusually dedicated and hard-working group of people, and they spent many, many hours personally going into all details of this question.

Mr. HARDY. Please don't construe my questions as suggesting that this wasn't an unusually capable Committee or a very dedicated Committee. I don't want to leave any such inference.

However, I do know that they are extremely busy people, and I know that even within my limited area up here I have a terrible time keeping track of the things that I need to do. I haven't had an opportunity to do the homework I should have done before coming over here this morning.

Secretary CHARYK. I think it was all the more noteworthy because they are such busy people that they took so much time.

Mr. HARDY. That would be interesting to explore.

Excuse me, Mr. Chairman.

Mr. HOLIFIELD. Mr. Roback.

FIRST STUDY OF FUTURE ORGANIZATION

Mr. ROBACK. Your answer to my first question referred to the Millikan Committee and the chairman asked about the composition, but I wanted to know the nature of the discussion, and when it was originated in the Air Force, for the future organization. There came a time when it was recognized there was going to be some kind of a change, and discussions ensued. If you don't know, perhaps General Schriever could respond to that question.

General SCHRIEVER. Yes. As a matter of fact, we made studies out on the west coast at AFBMD and BMC, starting back as early as late 1957. As a matter of fact, we always had the organizational structure under consideration because we realized we were in a dynamic situation.

We actually completed our study in early 1958, at which time we had concluded that a divestiture of the STL Division of R-W—previously it had been known as the Guided Missile Research Division—was in the best interest of the Air Force in providing for a stable and permanent type of organization.

Following a briefing which was given to the Air Force Ballistic Missile Committee, we initiated detailed studies and discussions with, first, R-W, as to means of divestiture. The problem has been with us for some time, and it isn't an easy one. The conclusion that it should become a nonprofit organization was not reached until sometime later. I don't remember exactly when. We looked at all possible

ways of doing it during the 1958 period. The Millikan Committee was set up in September of 1959.

Mr. GOLDEN. That is right.

General SCHRIEVER. But this has been a continuing study, I think we recognize——

PROBLEMS OF TRANSITION

Mr. HOLIFIELD. Could you list at this time some of the problems that you faced in making a transition from the Ramo-Wooldridge organization to a nonprofit organization? What was involved in the way of financial obligations which they had incurred? What was involved in the way of facilities which private money had furnished? What was involved in the way of lease obligations?

In other words, what were the factors which were involved in making this transition?

PERSONNEL PROBLEM

General SCHRIEVER. I am not sure that I can give you a detailed rundown on this. First of all, I think the main problem, of course, was the problem of people. We live in a democracy and you can't just order people to do things; they have to want to do them. So you can't simply say: "Tomorrow you are going to be a nonprofit organization." So you have the problem of people.

There was also the problem of facilities.

FACILITIES PROBLEM

Mr. HOLIFIELD. What was the nature of those facilities and what were the factors involved in their ownership?

General SCHRIEVER. Well, the facilities are divided into two pieces out there. Actually in three. We have a small amount of Government-owned facilities, we have leased facilities, and then we have the STL research center, which is privately owned by the STL Corp.

GOVERNMENT-OWNED BUILDINGS

Mr. HOLIFIELD. Now, getting back to the Government-owned portion, that presents no real problem, does it?

General SCHRIEVER. No, sir. That is a very small percentage.

Mr. HOLIFIELD. That is a small percentage?

General SCHRIEVER. Yes, sir.

Mr. HOLIFIELD. Could you define approximately the percentage?

General SCHRIEVER. Three buildings. I don't know the percentage. It would be less than 10 percent. We can give it to you exactly, but I know it is less than 10 percent.

(The following statement was later submitted:)

The three Government-owned buildings actually comprise about 12 percent of the net usable square footage of facilities space.

LEASED BUILDINGS

Mr. HOLIFIELD. On the leased buildings, who were they leased from, private parties or from the Government?

General SCHRIEVER. Private parties.

Mr. HOLIFIELD. Private parties. And what percentage of the problem did this involve?

General SCHRIEVER. Well, this did not involve really any major problems in a transition.

Mr. HOLIFIELD. How many buildings, do you happen to know?

General SCHRIEVER. There were 12 buildings involved.

Mr. HOLIFIELD. With what square-foot capacity, so we can look at it? In other words, you say it would be a minor subdivision of all the facilities?

General SCHRIEVER. Well, leased facilities at the present constitute about 262,000 net usable square feet—roughly 31 percent of the total.

Mr. HOLIFIELD. Of the buildings?

General SCHRIEVER. Of the buildings available.

Mr. HOLIFIELD. All right. Those facilities leased from private parties offered no particular problem; did they?

General SCHRIEVER. No, sir; not in this particular problem of transition.

STL-OWNED FACILITIES

Mr. HOLIFIELD. Now, did the STL privately owned facilities comprise buildings and equipment, or mainly buildings?

General SCHRIEVER. It is buildings and equipment.

Mr. HOLIFIELD. It is buildings and equipment?

General SCHRIEVER. Yes.

Mr. HOLIFIELD. And what percentage is that, either spacewise or dollarwise in value?

General SCHRIEVER. I would rather—I don't know exactly what the percentage is. But it is a substantial percentage, more than 50 percent of the total.

Mr. HOLIFIELD. Fifty percent-plus, we will put it, for the purpose of discussion.

General SCHRIEVER. Yes.

Mr. HOLIFIELD. And later you will have the opportunity to correct it.

General SCHRIEVER. Yes; we can furnish the exact figures. We have them here, but not broken down.

(The following information was subsequently provided:)

STL-owned facilities comprise approximately 57 percent of the net usable square footage.

STL OBLIGATIONS

Mr. HOLIFIELD. Now, were there additional financial obligations outside of the obligations against the STL privately owned buildings and equipment? Were there bond flotations, private loans?

General SCHRIEVER. I think I will have to ask Colonel Bishop, who has been working on the details of this. I think he could furnish this.

Mr. HOLIFIELD. All right, Colonel Bishop.

Colonel BISHOP. Well, I can only tell you what we know of the STL financing situation, and I say this subject to their correcting the record if I am in error.

Mr. HOLIFIELD. Yes.

Colonel BISHOP. To our knowledge they have no indebtedness, other than mortgage indebtedness against the facilities exclusively theirs.

Mr. HOLIFIELD. As far as any operating cash, or anything like that——

Colonel BISHOP. They do have a line of credit with the bank, but I believe this is a revolving credit, and it does not present long-term debt.

Mr. HOLIFIELD. Is it an obligated line or unobligated line of credit? In other words, are there notes due as a result of this line of credit, or is this an unused line of credit?

Colonel BISHOP. No; they are using the line of credit, but I believe it is all simply short-term loan for operating capital purposes.

Mr. HOLIFIELD. I see. So that would offer no particular problem, the assumption of short-term operating loans, if a transition was to be made?

Colonel BISHOP. It would not offer a problem at all; no.

Mr. HOLIFIELD. All right.

Mr. GOLDEN. Mr. Chairman, if you would like, we have the figures on the square footage of contractor-owned, contractor-leased, and Government-owned facilities.

Mr. HOLIFIELD. After this next question I will ask for that.

How much was there in the way of mortgages on item No. 3, the STL privately owned buildings and equipment? Do you have the figure on that, Colonel Bishop?

Colonel BISHOP. The amount of the mortgage; yes.

Mr. HOLIFIELD. The amount of the obligations of STL, which in any way is an encumbrance upon buildings and equipments.

Colonel BISHOP. Yes; I believe I can answer that question within a degree of accuracy. At the time the facilities were built, I believe about 2 years ago——

Mr. HARDY. About how long ago, Colonel?

Colonel BISHOP. I believe it was about 2 years ago that they were completed. That is roughly the date.

Mr. HOLIFIELD. Yes.

Colonel BISHOP. And at the time the Space Technology Laboratories, I believe, encumbered the facilities with a mortgage amounting to approximately $9 million. Since that time, of course, they have made their annual payments, and I believe the indebtedness today is on the order of $8 million, perhaps slightly above 8.

Mr. HOLIFIELD. Who was that indebtedness owed to?

Colonel BISHOP. I don't know for certain, but I believe it was a bank loan.

Mr. HOLIFIELD. Was it a bank loan secured by the——

Colonel BISHOP. By the facilities.

Mr. HOLIFIELD. By Thompson Products?

Colonel BISHOP. It was a mortgage loan against the facilities and secured by the property. Whether Thompson Ramo Wooldridge further secured the loan, I don't know.

Mr. HOLIFIELD. Will you furnish us information as to whether they were security in any way for the bank loan?

Colonel BISHOP. Yes, sir.

(The following information was submitted later:)

The only further security of the mortgage loan has been that security which is implicit in any loan taken out by a responsible company: the general credit of the company, in this case R–W/STL, and its parent corporation, Thompson Products, Inc. (later Thompson Ramo Wooldridge, Inc.).

Mrs. GRIFFITHS. Would you explain facilities? What facilities secured the loan?

Colonel BISHOP. Yes; facilities is a very broad term. We are referring here to the research center that was built, as I mentioned earlier, and completed about 2 years ago. It consists of nine buildings grouped together. These buildings are office space, administrative space, and laboratories.

Mrs. GRIFFITHS. Is there equipment in this?

Colonel BISHOP. Yes, ma'am.

Mrs. GRIFFITHS. And is that mortgaged, too?

Colonel BISHOP. I don't believe that there is a mortgage against the equipment.

Mrs. GRIFFITHS. It is just the buildings and the land?

Colonel BISHOP. I believe that is correct.

Mrs. GRIFFITHS. Thank you.

Mr. HOLIFIELD. Now, are there any other financial elements involved in the way of accumulated profits, reserves, stock equities to be considered, other than this $8 million loan?

Colonel BISHOP. I believe all other obligations are of a short-term nature: accrued expenses; accrued salaries; withdrawals against the line of credit.

Mr. HOLIFIELD. So, as far as the financial problem is concerned, we really come down to a factor of less than $9 million represented by bank loans against physical properties?

Colonel BISHOP. Yes, I believe that is accurate.

Mr. HOLIFIELD. And you know of no other obligations which are involved of a substantial or permanent type which have to be considered?

Colonel BISHOP. No, sir, I believe there are no others.

VALUE OF BUILDINGS

Mrs. GRIFFITHS. Mr. Chairman, may I ask?
What is the total value of the buildings?

Colonel BISHOP. Well, we have not established that.

Mrs. GRIFFITHS. What does STL say it is?

Colonel BISHOP. They haven't said either. As a matter of fact, we are each having an appraisal made of the facilities.

Mrs. GRIFFITHS. Have they ever told you how much they paid for the buildings, the total amount that was put into the buildings?

Colonel BISHOP. Yes.

Mrs. GRIFFITHS. How much did they tell you?

Colonel BISHOP. It is indicated in their balance sheet. It appears in their balance sheet, they didn't tell us.

Mrs. GRIFFITHS. Yes. How much is it?

Colonel BISHOP. This is very approximate, but I believe that the initial cost was on the order of $20 million, but there have been additions and modifications, so I don't know exactly what it might be today.

Mrs. GRIFFITHS. And during the time that STL put up the buildings was the Government the sole purchaser from STL?

Colonel BISHOP. I believe that is very nearly correct.

Mrs. GRIFFITHS. So for all practical purposes, the Government has actually—the taxpayers have paid the full price?

Colonel BISHOP. Oh, no, I wouldn't say the taxpayers. The building was built with retained earnings of the Ramo-Wooldridge Corp., prior to the merger, and with bank loans.

GOVERNMENT PERCENT OF RAMO-WOOLDRIDGE CORP. INCOME

Mrs. GRIFFITHS. Was the Government the sole purchaser from Ramo-Wooldridge?

Colonel BISHOP. I don't believe that we were the sole purchaser. We were the principal purchaser——

Mrs. GRIFFITHS. Did you purchase approximately 98 percent of everything that was ever purchased from Ramo-Wooldridge at that time?

Colonel BISHOP. I am not sure what the percentage would be, but it was substantial.

Mrs. GRIFFITHS. Would you supply it?

Colonel BISHOP. Yes, ma'am.

(The following information was submitted later:)

As indicated on page 50 of the hearings concerning organization and management of missile programs, February 4, 1959, military contracts represented 97.3 percent of total reimbursable costs from the company's inception to December 31, 1957, and Air Force ballistic missile contracts absorbed 61 percent of the total reimbursable costs incurred by the company. These overall percentages did not change appreciably between December 31, 1957, and the separate incorporation of STL on October 31, 1958.

TOTAL OF CERTIFICATES OF NECESSITY

Mr. HOLIFIELD. Would you also tell us, along that line, if the equity which has developed in the properties mentioned has been accumulated by certificates of amortization?

Mrs. GRIFFITHS. Yes, they have.

Colonel BISHOP. Well, yes, there have been certificates of necessity, I believe they are referred to.

Mr. HOLIFIELD. And do you have any accounting of the amount of writeoff which has occurred during the period of ownership due to certificates of necessity which had been granted to the STL group?

Colonel BISHOP. I do not have that here before me this morning, but we will be glad to supply this information. It is being assembled as a part of our appraisal of the facilities.

Mr. HOLIFIELD. All right.

(The following information was submitted later:)

As of March 31, 1960, a total of $4,947,550 has been amortized for Federal tax purposes. Of this total, $2,582,176 represents the excess over the amount which would have been allowed for normal depreciation had no certificates of necessity been granted by the Office of Civil and Defense Mobilization.

Mr. Hardy?

BUILDINGS CONSTRUCTED AS RAMO-WOOLDRIDGE RESEARCH CENTER

Mr. HARDY. Thank you, Mr. Chairman. I would like to explore the questions that Mrs. Griffiths was pursuing a little bit. These par-

ticular buildings were built specifically for STL as a contractor with the Air Force, is that right?

General SCHRIEVER. No, they were not. They were actually built for other divisions of Ramo-Wooldridge, and they were, at a later date, turned over to STL when STL was established as a separately incorporated division of Ramo-Wooldridge.

Mr. HARDY. Maybe we are not talking about the same thing. I understood we were talking about some buildings that were built specifically for STL, as such. Am I wrong?

General SCHRIEVER. Yes, you are wrong, they were not built for STL specifically.

Mr. HARDY. So then they were built prior to the establishment of STL as a systems management contractor for the Air Force?

General SCHRIEVER. They were built, the original buildings were built as a research center for Ramo-Wooldridge.

Mr. HARDY. They were built then as a research center for Ramo-Wooldridge, in order for it to carry out a contract which it had with the Air Force, is that right?

General SCHRIEVER. No, sir. Ramo-Wooldridge had other divisions besides STL, and had many other contracts with the Government, as well.

ALLOWANCES FOR COST OF BUILDINGS

Mr. HARDY. Did the Air Force—and this is the key to the question—did the Air Force, in fact, take into account the cost of this construction in its contracts with either Ramo-Wooldridge or Space Technology Laboratories?

General SCHRIEVER. I am not sure I can answer that.

Mr. HARDY. All right, let's change it a little bit. What kind of a contract did the Air Force have with Ramo-Wooldridge at the time these buildings were constructed? Cost plus fixed fee contract?

General SCHRIEVER. Yes, sir.

Mr. HARDY. To what extent did the cost of these buildings enter into your costs, or to what extent were they considered in fixing the fee?

General SCHRIEVER. I can't answer that. You might be able to answer that.

Colonel BISHOP. I can. I believe I can give you an answer. We have a fairly standard set of rules that we follow——

Mr. HARDY. I am not interested in your standards, Colonel, I am interested in what happened in this case.

Colonel BISHOP. In this case we followed the standard rules.

Mr. HARDY. Are you sure?

Colonel BISHOP. Yes, sir. In this case, in arriving at costs to be reimbursed, we examined the total sales of Ramo-Wooldridge, then, and later of STL, and we allocated reimbursable expenses according to their various contracts. Now, for our contract in the management of the ballistic missile program, it seems to me that there was approximately 60 percent of reimbursable cost allocable—60 percent of total Ramo-Wooldridge cost allocable to our contract. Therefore, in allocating depreciation on the facilities we first verified that the depreciation to be charged was proper and, secondly, that the allocation to our contracts was the proper percentage.

Now, that depreciation——

Mr. HARDY. That is your testimony with respect to this particular construction?

Colonel BISHOP. Yes, sir.

Mr. HARDY. That is all right. I am not arguing with it, I just want to know.

Mr. HOLIFIELD. The Chair recognizes that some of this was covered in our previous report, but in view of the fact that there has been a plan developed, we wanted to review for the record some of the salient points involved in order that we might understand it. On pages 86 and 87 of our report there is quite a bit of information on this particular matter, was well as elsewhere in the report.

Mr. Roback.

Mrs. GRIFFITHS. Mr. Chairman, I would like to ask a question.

Mr. HOLIFIELD. Yes.

NO ALTERNATIVES TO USE OF STL BUILDINGS AND EQUIPMENT

Mrs. GRIFFITHS. In determining what you are going to pay STL for these buildings—I take it you are going to take over the buildings?

General SCHRIEVER. This is our plan.

Mrs. GRIFFITHS. You are going to take over the buildings?

General SCHRIEVER. Yes, ma'am.

Mrs. GRIFFITHS. In determining what you are going to pay for them at the present time, can you find space other than these particular buildings? I have a report on my desk which points out that the Department of Defense has a lot of property in California that is usable, could be used, and that they are not using. Do you have other space that you could use in place of taking over STL?

General SCHRIEVER. There is other space available, but there are many factors involved in carrying out the management of these particular programs which make it not only desirable but almost mandatory that we continue to be located in the same area in order to get the job done.

Mrs. GRIFFITHS. I see. Now, when you take over this space, is all—will you take all the equipment, too?

Colonel BISHOP. Yes.

General SCHRIEVER. Yes.

Mrs. GRIFFITHS. Is this equipment up-to-date equipment, or are you going to have to modify it?

General SCHRIEVER. This is very much up-to-date equipment. It involves a lot of computers and data reduction equipment, and so forth. Oh, there are always, as you go along, certain modifications that are involved, but we don't need to modify just because of the transition.

Mrs. GRIFFITHS. How many other potential purchasers are there for this building, this equipment in this building?

General SCHRIEVER. The equipment in the building?

Mrs. GRIFFITHS. For the buildings, how many other potential purchasers are there for the buildings?

General SCHRIEVER. Well, I can't answer that.

Mrs. GRIFFITHS. Are there potential purchasers? Are there other potential purchasers?

General SCHRIEVER. I would guess, if we put it on the market, there would be plenty of potential purchasers for it.

Mrs. GRIFFITHS. It isn't your property, STL can put it on the market, can't they?

General SCHRIEVER. They could, yes.

Mrs. GRIFFITHS. How many other potential purchasers are there for the computers and other such equipment?

General SCHRIEVER. This is a very difficult question to answer. The type of equipment, of course, is fairly unique to the particular requirement.

Mrs. GRIFFITHS. So that there really isn't going to be any potential purchaser for the equipment?

General SCHRIEVER. I wouldn't say so.

Mr. HARDY. Unless you make a contract with them.

General SCHRIEVER. Oh, no.

Mrs. GRIFFITHS. In the first place, most of these computers, they don't even want to buy them, because they are writing off the rent on their payment of taxes. It is common practice, and we have had this explained now several times to this committee, for industry to rent computers because then they evade the tax laws.

General SCHRIEVER. The computers, for the most part, are rented, but there is a lot of data reduction equipment, and so forth, that is not rented. This is similar type of equipment, but this is actually purchased.

Mrs. GRIFFITHS. All I hope is that you get the same kind of a deal when you buy this that industry is getting from you when it buys something. I hope you see to it that you do it.

General SCHRIEVER. Well, let me say this, for the record: TRW does not want to sell those facilities. This is the last thing that they want to do.

Mr. HARDY. No, so long as they can keep this contract.

DESIRABILITY OF FACILITIES

General SCHRIEVER. Well, there are a lot of other potential contractors for the kind of skills and competence that this organization has, and they are not the least bit concerned about entering the competitive field and getting contracts to keep them busy, I can assure you that. They do not want to sell those buildings, it is the last thing they want to do.

Mrs. GRIFFITHS. Then why buy them? Why don't you put up some more? You have paid for those buildings once.

Mr. HOLIFIELD. I don't think we have established for the record whether it is the intention to buy these buildings.

Mrs. GRIFFITHS. Yes, they said that.

General SCHRIEVER. This is our plan.

Mr. HOLIFIELD. It is your intention.

General SCHRIEVER. As part of the overall plan to create the least disruption and get on with the job, there isn't any question but that all the factors point to the necessity, or the desirability, of procuring those particular facilities, the buildings and the equipment in them.

PRICE TO BE NEGOTIATED

Mr. HOLIFIELD. Now what is the sales price of these buildings as offered to the Air Force?

General SCHRIEVER. They have not established any sales price. The only agreement or understanding—not an agreement—that they will be appraised, and there will be a fair price established.

Mr. HOLIFIELD. There will be a fair price, at current market value?

General SCHRIEVER. Yes.

Mr. ROBACK. The current market value is at the request of the seller? There was a controversy, was there not, over the pricing?

General SCHRIEVER. I would like to have Colonel Bishop answer that, because he has been talking in some detail on this matter.

GOVERNMENT-OWNED EQUIPMENT

Mr. RIEHLMAN. Mr. Chairman, before you get away from the cost of the buildings, I would like to know whether or not any of the equipment or facilities that are now in those buildings are owned by the Federal Government.

General SCHRIEVER. Yes, there are some equipments in there that are—these equipments are in what we call—they are severable, some of the equipment is owned by the Government, yes.

Mr. RIEHLMAN. Some of the computers that were referred to by Mrs. Griffiths, are they owned by the corporation or are they owned by the Federal Government?

General SCHRIEVER. None of the computers are owned by the Federal Government. Most of the computers, as such, are on lease. I am not sure whether they own any of the computers. Do you know?

Colonel BISHOP. I am not certain. I believe that they are computers leased from International Business Machines Corp., which has a standard leasing plan.

Mr. RIEHLMAN. Yes.

General SCHRIEVER. They do own two computers, analog computers. The digitals are on lease.

(The following corrected information was submitted later:)

STL has purchased an analog computer and data-reduction equipment as a direct charge to the Air Force ballistic missile contract. This equipment will revert to the Air Force. In addition, STL has similarly purchased certain peripheral equipment associated with its computer center, which will also become Government property. STL does lease two digital computers under standard lease arrangement from IBM. This practice has made it possible to retain the latest computing equipment at all times, and has resulted in continual reduction in computer operating costs.

NEGOTIATING PRICES OF BUILDINGS

Mr. ROBACK. Colonel Bishop, what was the problem of pricing on the buildings?

Colonel BISHOP. Well, we don't have a problem that we know about, at least yet. As I mentioned earlier, we are getting appraisals made in the usual way, using the Corps of Engineers in this case and a local firm. The company, Thompson Ramo Wooldridge, is also having an appraisal made so that we have some figures to compare. We are looking at several yardsticks—initial cost, which is easy to arrive at from balance sheet figures—these are verified—fair market value, and replacement cost. Now, we have to take into account the fact

that these facilities were built as research and development facilities directly tailored to the needs of ballistic missile and space systems development work. There are a number of laboratories in the buildings that are tailored precisely to our requirements. In bringing in a new corporation it would need exactly these facilities. There is some value in having them where they are needed and fitted out as they are needed.

Mr. HARDY. I think we would all recognize that there would be some value in continuing these facilities, regardless of who continues performing the function that STL has heretofore been performing, you are probably going to need them. But I am interested in trying to see that whoever continues that operation does so without paying for those buildings twice.

Colonel BISHOP. No, sir——

Mr. HARDY. I am wondering, actually, Colonel—you know, when you negotiate a contract on a cost-plus basis, which you were doing at the time Ramo-Wooldridge built these buildings, certainly you have had allowances for use of buildings, maybe you might call it in lieu of rent—that has been in excess of normal depreciation figures.

Now, I don't know, it is entirely possible that there may have been buried in overhead enough money to pay the entire cost of those buildings already. That may account for some of the profits that they have been able to accumulate.

I don't know, I am just raising some questions here that I don't think have been adequately disposed of. Certainly they haven't been answered here this morning.

APPROXIMATE VALUE OF BUILDINGS

Mr. HOLIFIELD. Are we talking now of a possible value of these buildings ranging between $20 million and $30 million? I notice you said $20 million first cost. There have been some additions to it. Considering fair market value—and I am not pinning you down, because I recognize you are in negotiation, but I would like to get a concept of the general range, and without any implication that this is the genuine figure or that you should negotiate on this basis, but I would like to have a range of what we are talking about here.

Colonel BISHOP. Well, the range that we have considered to be the——

Mr. HOLIFIELD. In other words, I don't know whether you want to disclose offers and counteroffers in public or not——

Mr. HARDY. I doubt if it ought to be done.

Mr. HOLIFIELD. I doubt if it ought to be. But give us a general range.

Colonel BISHOP. There have been no offers or counteroffers to date. We haven't started negotiations on the facilities. We want good, sound appraisal information before we begin. But it is our estimate that the negotiating range is somewhat less than you indicated, perhaps on the order of $20 to $25 million. But the property account that we will be picking up is something that has to be examined, because, for example, there are leasehold improvements which would be properly purchased by the Air Force, and therefore these kind of costs would not be identified with a research and development center.

Mr. HOLIFIELD. Now, if we assume the lowest figure of $20 million first cost, with the qualifications that the Chair stated, and we assume approximately between $8 and $9 million bank loan against the properties, there would be an equity there in the neighborhood of $12 million which has been accumulated by the STL. Would that be an approximate statement?

Colonel BISHOP. Yes; that would be what the balance sheet would show.

RESULT OF AMORTIZATION POLICY

Mr. HOLIFIELD. All right. Now, whether it should have been done or not—we are not going into that because it was done and it was done legally, and of course, there are different philosophies in government: One says that the Government should build and own all facilities, and the other says that private industry should build and amortize them over a 5-year period.

So in any event, you operated under the customary procedure, which is to allow a defense contractor to purchase land and build facilities under the privilege of the tax amortization laws with a certificate of necessity; is that right?

(Secretary Charyk nods.)

Mr. HOLIFIELD. This was the method of procedure; that is all I seek to establish.

Colonel BISHOP. That is right; that is the procedure that is followed.

Mr. HOLIFIELD. All right. Now we are now faced with the results of that procedure. If the Government had done this, they would have owned this $12 million equity, but they did not do it, and therefore there is an equity which is privately owned and which, if the Government wishes to acquire the property, it must recognize under the law; is that true?

Mr. HARDY. You shouldn't ever undertake to acquire something privately owned without paying just compensation.

Mr. HOLIFIELD. That is right. I seek only to clarify the problem for the record. This is part of the problem we are facing; is that right?

Colonel BISHOP. Well, if I can speak to the point that I believe is at issue, and that is the matter of how much the Government has paid against these facilities since they were built——

DEPRECIATION ALLOWED AS COST

Mr. HOLIFIELD. Well now, wait a minute, what do you mean, how much has the Government paid? The Government hasn't paid anything, has it?

Colonel BISHOP. Only by recognizing an amount of depreciation as reimbursable cost.

Mr. HARDY. I wouldn't agree that is a fact.

Mr. HOLIFIELD. Which is included in the cost of the work done and upon which a fee has been realized; is that not true?

Colonel BISHOP. That is true.

Mr. HARDY. Of course, Mr. Chairman, anybody knows, examining any of these negotiated contracts, that the key to that question lies in the kind of a job that was done at the negotiating table.

Colonel BISHOP. Well, no, sir. The depreciation of the building——

Mr. HARDY. Depreciation is one thing, but there is a lot goes into overhead besides depreciation, and certainly a man is entitled to some return on his building other than depreciation. At least I think that is usually the case. If I owned a building I would expect to get something back for it, in consideration of its use.

Colonel BISHOP. Well, in arriving at a fee, we do take into account the contribution that the contractor is making.

Mr. HARDY. Of course. You take into account his overhead costs that are going to apply, bound to?

Colonel BISHOP. It goes into the fee base.

Mr. HOLIFIELD. That is right.

Colonel BISHOP. It goes into the fee base. But——

Mr. HOLIFIELD. This is customary.

Mr. HARDY. That is correct.

Mr. HOLIFIELD. The services that you render include overhead and a fair rental value for private property.

Mr. HARDY. Of course.

Mr. HOLIFIELD. And it also includes the privilege of amortization.

The committee is not at this point sitting in judgment on what should have been done in the first place. The committee does want to understand what the situation is so we will know what you are faced with in the solution of the problem under the plan which you have submitted. That is why I am trying to bring out these points for the record.

Mrs. GRIFFITHS. Mr. Chairman, the unique part of this is that generally the Government builds the building and then the contractor buys it for about 10 cents on the dollar. In this situation it is my contention that the Government really bought this building, paid for the entire building. Now, the Government is going to rebuy it from these people at 100 cents on the dollar, and the sellers are going to get it taxed as a long-term capital gain.

Mr. HOLIFIELD. Of course, this depends upon the meaning of the word "buy" that you have used. The formula that I have described, I think, is the legal formula. If this interpretation is true in this instance, it is true in all instances where this formula is used, and it is used in many other instances. The Chair only seeks to be fair in pointing out that the procedure which has been followed here has been authorized by the Congress and by the executive branch.

Now, as to the wisdom of using it, I am not sitting in judgment. That is a point which the Chair can't decide one way or the other.

Mr. HARDY. I don't think——

Mr. HOLIFIELD. The only thing that this committee is concerned with is to explore the problem that is involved, because it may involve possible suggestions for future legislation, and certainly it requires an understanding of the problem.

Mr. HARDY. Could I make this observation, Mr. Chairman?

Actually, I think maybe we do need to make a separation in our thinking. It is a little difficult for me sometimes to avoid taking a backward look at what has transpired. Frankly, I am not at all sure we are going to be able to find out what transpired back in the past after we get through this transition that we are now talking about, but I certainly wouldn't suggest that there wasn't a legal basis for what they did.

Now, as to the manner in which it was carried out, that is another question. Some of the examinations of contracts the Air Force has negotiated have so much waste, I doubt that as good a job has been done as might have been done. I am not suggesting illegality. That is why I said a moment ago the key to whether or not we are paying for these buildings twice rests upon the kind of negotiations that were had with Ramo-Wooldridge, Thompson Ramo Wooldridge and Space Technology Laboratories during the series of negotiations that were held. That I think is the key to the problem. The fundamental problem with which we are concerned and this committee is concerned with it.

Mr. HOLIFIELD. The committee at this time is not investigating the negotiation of contracts.

Mr. HARDY. That is correct.

Mr. HOLIFIELD. This might well be a field of inquiry which some committee might want to pursue, not only in this case, but in many other cases, but we do not have that under consideration at this time.

Mr. Roback, will you proceed?

DECISION ON NONPROFIT POLICY

Mr. ROBACK. General Schriever, we had established that the Ballistic Missile Division during 1957 and 1958 had given consideration to this problem, and did you testify that there eventuated a decision to convert to a nonprofit corporation? At least a decision at the Ballistic Missile Division level?

General SCHRIEVER. Did I understand you to ask was there a decision at that time?

Mr. ROBACK. Had a decision been formulated before the Millikan Committee was appointed?

General SCHRIEVER. There was not an official position on the part of the Ballistic Missile Division that it should be a nonprofit corporation. There were certainly individuals who were involved in making the detailed studies who believed that it should be a nonprofit organization. I perhaps was one of the last ones to feel that this was the only answer. By the time of my discussions with the Millikan Committee I had definitely made up my mind that the only solution was a nonprofit approach to the problem.

I think we investigated ad nauseum, you might say, every other approach possible, and none of them really seemed to answer the questions that we had or the problems that we had.

MODEL FOR NEW CORPORATION

Mr. ROBACK. Did you have before you in 1958, when this was under consideration, the model of the MITRE Corp. which was established up in Cambridge or the Boston area?

General SCHRIEVER. I did not look at it at that time. I was familiar with ADSID and I was familiar with MITRE. And the MITRE Corp. was performing quite a different kind of a job than was STL for the Ballistic Missile Division.

Mr. ROBACK. But at any rate, these ideas had been formulated, and the Millikan Committee was set up after this committee's report was presented, to consider the matter further?

General SCHRIEVER. That is correct.

MILLIKAN RECOMMENDATIONS

Mr. ROBACK. Right. Did the Millikan Committee, in recommending certain changes which Mr. Charyk summarized, make any recommendation as to whether it ought or ought not to be a nonprofit corporation?

General SCHRIEVER. No, sir, it did not.

Mr. ROBACK. It didn't specify on that point. Is it the case that the Millikan Committee report recommended changes which could have resulted in either a profit or nonprofit corporation?

General SCHRIEVER. That is correct. I think you could have interpreted it that way, yes, sir.

Mr. ROBACK. You could have drawn, you might say, opposite organizational conclusions from the recommendations of the Committee?

General SCHRIEVER. That is true.

Mr. ROBACK. Why were the recommendations of the Committee in that sense, or to that extent, ambiguous? Was it because there were differences of opinion which could not be resolved?

General SCHRIEVER. I can't speak for the Committee.

Mr. ROBACK. Give us your impression.

General SCHRIEVER. My impression is that that is true, yes.

INCENTIVES OF NONPROFIT CORPORATION

Mr. ROBACK. What were the fundamental difficulties which beset the Committee? Was there a crystallization of views as to whether, let's say, it should be a profit or nonprofit corporation? Can you summarize or convey to us what the basic issues were that the Committee could not agree upon?

General SCHRIEVER. I don't believe I can, because I did not talk to the Committee collectively after they submitted their reports, and I have only talked to several of them since then, and I have never gone into detail as to why they were unable to arrive at a collective decision whether this should be a profit or nonprofit organization. I know—I might just add this: That there are views held by certain people, and I know this was true on the Committee, that you can't get the kind of hard-driving, dynamic organization in a nonprofit organization that you can in a profit organization. And in view of the fact that this job has not lost one bit of urgency since 1954—as a matter of fact, it perhaps has a greater degree of urgency than in 1954—the need for a hard-driving, dynamic organization, in support of these programs, still exists.

This is what we have in mind, incidentally, and I don't agree that we can't get that kind of an organization in a nonprofit status.

Mr. HOLIFIELD. I note in the Millikan Committee report:

> A reorientation of the role and the mission currently assigned to STL is urgently required in order to preserve its capacity to perform its essential functions and assign to industry and other agencies those functions which can be performed by them. This should be programed immediately and implemented as rapidly as practicable.

General SCHRIEVER. Yes.

REAL AIM IS PROGRESS OF MISSILE PROGRAMS

Mr. HOLIFIELD. This is along the line of our recommendations, and there is one thing that the committee wants understood, that in whatever transition occurs, the primary consideration is not interfering with the progress of this program. That doesn't mean we should disregard the other problems that are involved in the transition. But I submit the sum that is involved here in relation to the total expenditures in the missile program is almost infinitesimal.

General SCHRIEVER. Yes, sir.

Mr. HOLIFIELD. We seek a valid and just and honorable transition. But if we gag on this and we fail to implement this program of continued missile development, the Nation would lose far greater money, prestige, and safety than the sums that are here involved. I don't say this now to excuse any misuse of the negotiating power, because the committee believes proper negotiation can be accomplished along with the other objective.

Mr. HARDY. Permit me to make this observation in connection with what you just said. Certainly, we don't want to do anything that is going to slow down this program. But I can't quite subscribe to the idea that the funds that are here involved are infinitesimal.

Mr. HOLIFIELD. In comparison to the total missile program——

Mr. HARDY. Yes, but——

Mr. HOLIFIELD. Please finish my sentence.

Mr. HARDY. All right, I am glad to complete it, insofar as that goes.

Mr. HOLIFIELD. Because this runs into billions of dollars, the missile programs.

Mr. HARDY. I understand, I understand. But we are not talking merely about the amount of the cost of the contract with STL or its successor, because the key to what is involved here is the costs that that organization may have a major responsibility for in terms of the entire systems program with which it is concerned. Undoubtedly that organization is going to affect costs, it has to affect the costs, and the amount that is involved here in terms of the contract with that organization has very little relationship to the total effect which the organization, itself, has on the cost of this program as a whole.

Mr. HOLIFIELD. I am talking about the cost of transition from private ownership of this facility, if it is, as has been decided, necessary to make this transition to Government ownership. This cost, whatever it may be, within the bounds of fair value and legal procedure, should not be allowed to jeopardize the successful implementation and the continued rate of progress of the missile program.

Mr. HARDY. Well, Mr. Chairman, great progress has been made and undoubtedly much is attributable to the organization which Ramo-Wooldridge and STL have built up. But there is another factor, though, that I don't think we ought to overlook. The STL organization in itself plays a major role in determining what the cost of this whole program is going to be. Actually, if we are talking about merely the cost of transition, we are really limiting the scope of the inquiry. Maybe we aren't competent to pass on the wisdom of this decision, as to whether this transition should proceed, but its ultimate effect on overall costs could be tremendous.

Mr. HOLIFIELD. The subject before this committee is the plan of transition, and the costs that are involved at this particular time. The overall missile program and its wisdom are not before the committee.

Mr. HARDY. I understand that.

Mr. HOLIFIELD. This is a matter which might properly be looked into by any appropriate committee of Congress. But I am trying to hold the hearings to the original purpose of the committee in making this inquiry.

Mr. HARDY. But when we talk about the plan of transition, aren't we going to have to be concerned with the effect that transition is going to have subsequently on the overall costs?

Mr. HOLIFIELD. Well, there is no evidence before the committee that the plan of transition would make——

Mr. HARDY. Would make any difference?

Mr. HOLIFIELD. Would make it more costly than it has been. To arrive at that conclusion you would have to establish that Government ownership of these facilities would make it more costly to manage the program than what it has been in the past.

Mr. HARDY. No. But the point is this: You read from a statement there a moment ago calling for a reorientation of Space Technology Laboratories.

Mr. HOLIFIELD. That is right.

Mr. HARDY. That called for reorientation. But that report, as I recall it, did not specifically suggest that it be a nonprofit corporation, it merely asked for a reorientation. Actually, you have a separate corporation now. Why go through all this agony?

Mr. HOLIFIELD. The problem that is involved is the original problem on which the committee made its recommendations. The committee recommended that this ambiguous position of a private corporation sitting in judgment in the seat of government should be removed.

Mr. HARDY. Mr. Chairman, you were right, that it ought to be removed.

Mr. HOLIFIELD. Pursuing that, we are at this time trying to ascertain the methods by which the Air Force is following out the recommendations of the committee.

Mr. HARDY. My point is that actually the recommendation of the Millikan committee didn't go so far as to suggest that there be a Government corporation, or a nonprofit corporation, it simply suggested a reorientation. You have a corporate structure, and if you are going to continue a private corporation, the only thing you would need to do would be to reorient it. You wouldn't have all this problem of buying these buildings.

PROBLEMS OF CONVERTING STL TO NONPROFIT BASIS

Mr. ROBACK. Mr. Charyk, can you tell us what was involved, bearing on what Mr. Hardy said? You had a corporation here; why didn't you convert that corporation or reorient it?

Secretary CHARYK. Well, I think that the reasons are many. Some of them have been alluded to; one is the continuing problem that we face if this organization is to work in an intimate role with the

Air Force and with individual contractors, and, thereby, have access to a wide variety of information, both within the Government and within different industrial organizations. Very special problems are obviously created.

Mr. ROBACK. We understand.

Secretary CHARYK. If this is a private corporation.

Mr. ROBACK. Let's consider the problem simply: You had a privately owned corporation giving management services of a designated sort. There was a certain amount of study within the Ballistic Missile Division and a considerable body of sentiment for a nonprofit corporaton. That has been testified to. Then this matter was studied by a committee. What were the obstacles to converting STL into a nonprofit corporation so that you would have the same corporation without the profit feature?

Secretary CHARYK. I think that the mechanism of conversion of STL to a nonprofit corporation is extremely difficult. I mean, the details of such a transition, the determination of the appropriate costs, and so on, raise a whole series of very complicated questions.

In addition, I am sure that there are certain individuals in the Space Technology Laboratories who would feel that they would prefer to remain with a private corporation.

STL OPPOSITION TO NONPROFIT PLAN

Mr. ROBACK. Is this hypothetical, or are you saying that in fact there was opposition within the corporation to this type of conversion?

Secretary CHARYK. There is the feeling on the part of certain people within Space Technology Laboratories that they would not transfer to a nonprofit corporation.

Mr. ROBACK. Presumably that was an influential and important segment of opinion because otherwise it could have been disregarded.

Secretary CHARYK. That was a factor.

Mr. ROBACK. So the Air Force was confronted with the problem that STL was not prepared to agree to become a nonprofit corporation, as such; is that correct?

Secretary CHARYK. No, I wouldn't phrase it that way. I would say that there is no reason why the transition could not have been accomplished. I am saying, however, that in the accomplishment of this transition it is fairly clear that certain individuals would be lost to the total effort.

Mr. ROBACK. In other words, if you had converted STL to a nonprofit corporation, then an important segment of the management of the corporation would walk out, is that what you are testifying?

Secretary CHARYK. No. I honestly don't know what the number of people would be that would actually leave the organization. I am sure there would be some.

Mr. ROBACK. But that was an important consideration which prevented you from going ahead with it?

Secretary CHARYK. It was one of the factors.

Mr. HOLIFIELD. Let's explore that. How important was it, because we want to know why the recommendation of this Committee was not followed to the point of complete conversion from a privately owned organization to a nonprofit type of organization, similar, let us say, to the Rand Corp.

Secretary CHARYK. Well, an additional reason, and a very important one, was that if we were to simply make a transition we would still not have the kind of an organization that we need for the long term. In other words, the organization that is visualized here and in which a portion of the responsibility that STL has been discharging would go back to industry, means that the size of the proposed organization will be considerably less than the size of the present STL organization. So that if we were to accomplish a simple transition, then we would have a much larger organization in being than we think we want in the long term.

This would present additional problems further down the road.

Furthermore, the mechanics of transition of this wholly owned subsidiary into a nonprofit corporation raises a whole series of questions, one of the most prominent of which has to do with the determination of appropriate costs to the Government. So these are some of the factors, at any rate, that led us to the conclusion that we reached.

Mr. HARDY. But the Millikan Committee didn't necessarily recommend that it be a nonprofit corporation?

Secretary CHARYK. They did not.

Mr. HARDY. So that actually you had all of the structure that was required, the only thing that you needed to do was to reorient it, to comply with their recommendation? The Air Force went a step further and said it would be nonprofit.

Secretary CHARYK. That is correct.

TWO CORPORATIONS FOR IMMEDIATE FUTURE

Mr. ROBACK. Is the situation this: That you could not get full agreement within the Air Force or within the company to convert STL to a nonprofit corporation, so you reduced the functions of STL by transferring some of them to a new corporation; and now you have two corporations where you had one before?

Secretary CHARYK. This is the net effect. We will end up with two corporations. One is STL, which will remain as a private company. The other will be a new nonprofit organization established to carry out many of the functions that are presently assigned to STL.

FUNCTIONS OF NEW CORPORATION

Mr. HOLIFIELD. Let me ask you this: The new corporation would, in a sense, follow the original concept of what we called a "think" management team, completely objective, completely analytical, and with no obligations for development, is that right? If not, will you please define what the new corporation would do.

Secretary CHARYK. Well, I would qualify that slightly, Mr. Chairman. I wouldn't say that the new organization would be completely analytical, in that I think it is essential that they enter into certain experimental research in order to properly discharge their functions.

Mr. HOLIFIELD. How would you compare it to the Rand Corp.'s functions, for instance?

Secretary CHARYK. Rand is completely analytical, or essentially completely analytical. I would visualize that this new corporation would get involved in a much more substantial fashion in experi-

mental activities, in order to provide the best possible basis for the rendering of technical advice. In addition——

Mr. HOLIFIELD. So actually they would do some laboratory type of research and development in vital fields?

(Secretary Charyk nods.)

Mr. HOLIFIELD. The preliminary research and development, you might say. And how much development, only laboratory model type development?

Secretary CHARYK. It would be limited to that.

NEGOTIATED CONTRACTS FOR ADVANCED DEVELOPMENT

Mr. HOLIFIELD. All right. Now, let us assume you have finished a device in your new corporation laboratory, and you have arrived at the point where you wanted further development of that, then would that go over to the profitmaking STL group?

Secretary CHARYK. No. In the example that you cite there would be generated a request for proposal to the industry to develop an item along the lines that the research program had suggested.

Mr. HOLIFIELD. All right.

Secretary CHARYK. And then there would be competitive bidding for the development of that article.

FUNCTIONS LEFT TO STL

Mr. HOLIFIELD. I see. Well, what function would the STL perform, then? Would it be in the same category, as far as the Air Force is concerned, as Lockheed or any other privately owned corporation?

Secretary CHARYK. We feel that for the foreseeable future it is important that STL continue the detailed systems engineering and technical direction work on Atlas, Titan and Minuteman, and they will, of course, continue to be subject to the restrictions that are now in effect in regard to these programs. They would, however, at the time that the new corporation has taken over all the other responsibilities, be free to compete on other items that would arise in the future.

Mr. ROBACK. The thrust of the Millikan Committee recommendations was that the kind of technical assistance that the Air Force requires would be such that the new corporation would give technical advice and monitor programs, but the systems engineering and technical direction heretofore exercised by STL would eventually gravitate toward associated contractors on these big weapons systems.

Secretary CHARYK. That was their recommendation.

Mr. ROBACK. And that would be for future and new programs, whereas on the present programs; namely, the present missile programs, and perhaps several other programs, STL would continue to function as before?

Secretary CHARYK. That is correct.

EXPECTED END OF TWO-CORPORATION SETUP

Mr. ROBACK. So what would be the terminal date on the existence of STL, would it be the termination of the Minuteman program?

Secretary CHARYK. Well, we would intend at the appropriate time to transfer the responsibilities for Atlas, Titan and Minuteman to the appropriate organization. In other words, Convair, for example, at the appropriate stage in the development would assume the complete system responsibility for the Atlas.

Mr. ROBACK. In other words, as the weapon matured and production was accomplished, the contractor who had that production responsibility would acquire the complete responsibility for the weapon?

Secretary CHARYK. That is the plan.

Mr. ROBACK. Isn't that the case now with the Thor, that you have phased out, so to speak, STL responsibilities, and the Douglas Co. has complete control over the Thor, as far as engineering and everything else is concerned?

Secretary CHARYK. Yes, essentially so.

Mr. ROBACK. So that would be true of the other development systems?

Secretary CHARYK. As they reach that point, yes.

Mr. ROBACK. What would you assign as a likely terminal date to the role of STL in that capacity?

Secretary CHARYK. I would say that this would be conditioned by the date on which the Minuteman reaches a state of development where the responsibilities can be assumed by the other members of the development team.

Mr. ROBACK. Would mid-1965 be a reasonable or likely date?

Secretary CHARYK. I think it would be much sooner than that.

Mr. HARDY. But for the time being, even after you set this corporation up, STL would continue to perform the same services it has been performing over these 2 or 3 years, wouldn't it?

Secretary CHARYK. Their activities would be restricted to the Atlas, Titan, and Minuteman, and the completion of certain experimental space projects.

REVISION OF STL CONTRACT COSTS

Mr. HARDY. How much would that contract be reduced by?

Secretary CHARYK. Well, I don't think we have a definite figure on that at the moment. The Atlas, Titan and Minuteman at the present time comprise roughly 60 percent of their present effort, so that there would be a reduction fairly promptly to support at about that level.

Colonel BISHOP. Let me clarify that 60 percent. That is 60 percent of the contract that is involved for systems engineering and technical direction, and those related functions which would go to the new corporation, but they do have other contracts for space probes.

Secretary CHARYK. Yes.

ADDED COST OF NEW CORPORATION CONTRACT

Mr. HARDY. Have you budgeted the cost of your new contract with the new corporation? Let's take the two together, how much more are they going to cost you than your present contract with STL?

Secretary CHARYK. I think there would initially be a total budget that would be somewhat greater than the present STL budget. But the reason for this, in addition to certain special costs associated with

the new organization, would be due to the fact that we would attempt to bring the new corporation into program areas where, up to the present time, STL has not been exercising a systems engineering and technical direction function.

SAME FACILITIES TO BE USED

Mr. HARDY. And STL will be continuing its contract in the same buildings where they are now located, in the new corporation's buildings?

Secretary CHARYK. For the time being that would be the case. It is my understanding that they will plan in the long term to move to new facilities.

Mr. HARDY. So they will work side by side with the personnel of the new corporation?

Secretary CHARYK. In the initial stages, that is absolutely correct.

Mr. HARDY. Even then, where do you accomplish any of this divestiture that you have been so urgently seeking?

Secretary CHARYK. Well, I don't——

RESTRICTIONS ON INTERCHANGE OF INFORMATION

Mr. HARDY. You can't, Mr. Secretary, you are not going to accomplish the objective that you have set out here, if you are continuing your STL contract, they are going to be working in the same facilities, they are going to be working side by side with the personnel of the new corporation, they are going to be privy to all of the sessions and all of the meetings and all of the considerations that they now have, so what have we accomplished?

Secretary CHARYK. Well, I would certainly not agree that there will be complete interchange of information. As a matter of fact, it will be important on our part to insure that there is no interchange of information between the programs in which STL is involved, which would be Atlas, Titan and Minuteman, and the activities with which the new corporation would be involved. The information flow should only be in one direction, in other words, the new corporation will clearly have to retain familiarity with Atlas, Titan and Minuteman, but I think it is important that we set up proper barriers so that information does not flow the other way.

Mr. HARDY. From a practical standpoint, you have been around a long time, Mr. Secretary, do you believe that can be done?

Secretary CHARYK. I think it is in the long term desirable to physically separate the two corporations. I simply suggest that going into the new operation, it really isn't practical to consider from the first day a physical separation of the two companies. We certainly have the intent to move toward physical separation at an early date.

Mr. HARDY. Yet all the testimony that I can recall of Air Force personnel and of people that had a direct connection with STL before the Hébert committee indicated that there wasn't a thing in the world wrong with the present setup, that there was such complete separation that there couldn't possibly be any chicanery going around, that there wasn't anything improper in the fact that STL, as a private organization, had access to all this information which should be avail-

able only to governmental personnel. The Air Force contended that nothing was wrong with the setup, but now we are going to create a new corporation, duplicate the effort, bring another group of people in on this privileged information, and I wonder if we aren't just actually going to spend more money and accomplish absolutely nothing.

Secretary CHARYK. I think it is fair to say that the Air Force has always been very careful to insure that there is a restriction in the flow of the type of material that is handled by BMD, BMC, and STL. I think General Schriever might perhaps elaborate on this, but we have exercised considerable care to insure that STL has received only the type of information necessary for them to properly discharge their——

NO KNOWN IMPROPER USE OF INFORMATION

Mr. HARDY. I would like for General Schriever to comment on that, and when you do, General, I think it might be appropriate for you to indicate where, actually, there have been leaks or improprieties that have grown out of the present arrangement.

General SCHRIEVER. Well, I don't know of any leaks or impropriety that have grown out of the present arrangement. There has been a lot of loose talk, but I have never yet had a specific case brought to my attention in which any impropriety has been verified or validated.

Mr. HARDY. So you are going to recommend the expenditure of all this money just because somebody is talking loosely and can't back it up?

GROWTH MOTIVES

General SCHRIEVER. No. There are other very important factors involved here over the long term. I think it is fair to say that a private corporation has objectives that are incompatible to some extent with the objectives of the Government.

For example, they are a profitmaking organization. The Government is attempting to get a job done in the shortest period of time and most efficiently. A private corporation has a great inner pressure to grow. It naturally wants to grow.

Going further down the line, as we look at the Millikan Committee recommendations and the kind of things that we want to continue to do, the evaluation of contractor proposals—not for competitions for contracts, but technical proposals that are always coming in—there is a tendency for private industry not to make available freely all of the technical ideas they have. The advanced planning function is perhaps the most important function that we need to carry out in order to keep up with the rapid——

Mr. HARDY. But you can do that under your present system, can't you?

CRITICISM OF STL ARRANGEMENT

General SCHRIEVER. You can do that under your present system and continue to have much criticism heaped on your head.

Mr. HARDY. So, in other words, you are going to spend all this money just to avoid criticism, and you are not going to avoid it because you are not correcting the very thing that is causing it now.

General SCHRIEVER. Well, let me say this, having been associated very closely with this thing for a long time, for the past 2½ years I have probably spent more time in trying to take care of the criticisms that have been heaped on us than I have been able to spend in trying to get on with the job. And I think you reach a point of no return here somewhere, and I think we have reached it, and this is——

Mr. HARDY. So you are clutching at straws?

General SCHRIEVER. I am not clutching at straws. We have carefully looked at this, and we think we are on the right track. I am sure there is nothing perfect in this business, we are not claiming it is, but we think it is the best solution to the problem.

Mr. HARDY. But you are doing it just to stop this criticism?

STABLE AND PERMANENT ORGANIZATION WANTED

General SCHRIEVER. Oh, no, no; I want to see an organization that has stability and permanency to it, and that can get the job done for the national security. I believe completely in what we are trying to do.

Mr. HARDY. There is nobody taking issue with what you are trying to do insofar as the program is concerned.

General SCHRIEVER. The criticism part of it, Mr. Hardy, is only one aspect of it. I think it is important that when you look at it from the standpoint of the morale of the people who are receiving the criticism on the other end, and of the time that is involved in defending yourself, there are very tangible aspects which are related to this business of being constantly harassed and criticized.

Mr. HARDY. Can you fix a point in time when this new setup is going to reach a stage where it will eliminate this criticism? It won't do it in the beginning, obviously, from the Secretary's testimony.

General SCHRIEVER. Well, I think that there is no setup that will completely eliminate criticism, but I do believe—and I have worked with industry for a long time—that there will be substantially less criticism of this arrangement than there has been, the arrangement we propose, than there has been of the past arrangement. I am not apologizing for the past arrangement because I would be foolish if I did. I was the architect of it——

Mr. HARDY. You have bragged on it so much before, you would be in bad shape if you started apologizing for it now.

General SCHRIEVER. I still will continue to brag, because I think the circumstances at the time demanded it.

Mr. RIEHLMAN. Mr. Chairman, I wouldn't want to get into this discussion any further than to make this statement, that I would concur in what General Schriever had to say. He has a right to brag in the accomplishments. This was a serious situation, as I recall it, that we were confronted with; it called for rapid decisions to accomplish something in this missile program.

Certainly mistakes have been made, and probably will be made from now on, but I certainly would never degrade the actions that were taken or criticize them at that time, because I know they were productive and they were necessary.

Mr. ROBACK. In the course of this testimony I think the committee should understand clearly how the situation stood; namely, that

there was considerable sentiment in the Air Force, in the Ballistic Missile Division, for a nonprofit corporation. However, you didn't go that road because of opposition in STL. Is that properly stated?

General SCHRIEVER. Are you asking me?

Mr. ROBACK. I will ask you, General Schriever.

General SCHRIEVER. I would go along with Dr. Charyk on this, that this was one of the important factors in the overall decision. There were other factors.

PUBLIC SALE OF STL ASSETS NOT PROPER

Mr. ROBACK. Well, Dr. Charyk spoke about costs as one of the factors. Was it a matter of bookkeeping, or was it a matter of how the assets of the corporation were going to be disposed, as, for example, through a public sale or through a ——

General SCHRIEVER. Yes, sir; there was a very important consideration as to how you arrived at a fair price, a public sale—I don't want to take the time to enumerate, but there are many disadvantages or factors that were undesirable in a public sale proposition.

Mr. ROBACK. But a public sale would have yielded a much greater return for the assets than, let us say, turning them over to the Government at acquisition cost.

General SCHRIEVER. This was—let me tell you my personal view on this. This is a glamorous organization, glamorous business, space, and so forth, and there isn't any question in my mind that public sale would have brought in much more than any other form that we could have arrived at.

Mr. ROBACK. Did STL want a public sale?

General SCHRIEVER. This was one of the proposals made, amongst several others.

Mr. ROBACK. The decision ultimately had to come before the Secretary of the Air Force; so what was the disposition or the inclination of the Secretary? Did he favor a public sale or did he favor the Government taking over this corporation? Can you say, Mr. Charyk, for the Secretary what the disposition was?

Secretary CHARYK. I can say this, that having reviewed the proposal for a public sale, the Secretary determined that this was not a proper solution to the problem.

AIR FORCE WILL BUY FACILITIES FOR USE OF NEW CORPORATION

Mr. ROBACK. So caught between an unwillingness to have a public sale and an unwillingness to leave the situation completely as it was, the Air Force compromised the matter by having a nonprofit corporation and a private corporation coexisting for a period of time. Now, it was the plan for the acquisition of the Government facilities based on the concept that the Government would buy what the corporation owned and turn it over as Government-furnished property to the new corporation? Is that why you have to buy those facilities, because the new corporation needs them?

Secretary CHARYK. Well, we feel that it is important in the discharge of the new company's responsibilities, in introducing the permanency and stability that is necessary in providing adequate arrangements for the laboratory and experimental work that must be

carried out, that it is basic that the new corporation have facilities of its own. And the simplest route to accomplish this in an early time period is through the acquisition of the Research Center.

Mr. ROBACK. In other words, the simplest way is for the Government to furnish the facilities to the new corporation?

Secretary CHARYK. That is correct.

Mr. ROBACK. And that is the plan?

Secretary CHARYK. That is the present plan.

Mr. HOLIFIELD. Off the record.

(Discussion off the record.)

Mr. HOLIFIELD. The meeting will adjourn at this time and we will be back here at 4 o'clock.

(Whereupon, at 11:58 a.m., the subcommittee adjourned, to reconvene at 4 p.m. of the same day.)

AFTERNOON SESSION

Mr. HOLIFIELD. The subcommittee will be in order.

The subcommittee did not get very far in our examination of the witnesses this morning. Also there was some confusion about certain matters which were discussed.

NEED FOR NEW CORPORATION

Before we go into details of the afternoon session, I would like to have you, General Schriever, state simply in your own words why you believe that this new corporation is to be created and what functions it will perform or should perform? I ask you this, General Schriever, because you were the officer who had the basic responsibility for the Air Force ballistic missile program during the past 5 years, and while you are now a step higher in the command organization, the ballistic missile agency still reports to you. So at this time, if you will state in your own words——

General SCHRIEVER. Well, maybe I should first state a general situation which points up, in my opinion, the urgency of the job that remains to be done out there, and then go into a little more detail with respect to why I feel that the new corporation should be set up and then what the functions are.

First of all, in the general picture we are entering, of course, really into the nuclear rocket age in the world today, which changes very considerably the whole world situation, and changes specifically the U.S. position in the world because of the tremendous impact that rockets and nuclear weapons have made in the capability of an enemy to strike with little or no warning. So the need for retaining our deterrent posture for all-out total war is perhaps more important today than it has ever been in the history of the country.

The job ahead, specifically, during the next few years, as I see it, is one largely involved in reducing the vulnerability of our retaliatory forces, our offensive forces, and, secondly, of reducing the possibility or probability of surprise attack.

Now, first of all, in reducing the vulnerability of our forces, ballistic missiles play an extremely important role. But we have just begun to introduce missiles into the operational inventory.

We have just, therefore, gotten a part of our job done. The job of introducing advanced missiles such as the Minuteman, improving the reliability and really making these systems work in such a way that they will constitute the deterrent posture we need, involves a very great deal of work that is still ahead of us.

In the area of reducing the probability of surprise, our military space systems, which we have under development—such as our warning system, the MIDAS, and our surveillance system, the SAMOS, communications systems—are just really getting underway. They have been, of course, moving along, but the job is still ahead of us.

These ballistic missiles and space systems which I have mentioned are under the management of our west coast complex, which, of course, is the AFBMD, the Ballistic Missiles Center, and the Space Technology Laboratories. This total effort constitutes about $2 billion of our military budget. This means not just the R. & D. part, but actually getting them into the field as well. This is a sizable part of the total Air Force budget.

Mr. HOLIFIELD. Does this include the production cost of the missiles that are being tested?

General SCHRIEVER. This includes everything, about a $2 billion a year program which is being managed out on the west coast.

Therefore, I think it is fair to say that from the standpoint of the national security—I might even say national survival—this is perhaps the most important management complex that we have in the country today.

The degree of urgency, I think, is obvious when we look down the road, as I have explained: we are living in a different world, our deterrent posture is a mandatory thing.

The problem of continuing our operation there has been, as we discussed this morning, under study for some sime. We have looked at various different ways of improving the management from the standpoint of reducing criticism, of establishing a more stable operation on a permanent basis, at the same time retaining the competence that exists there today, and we have looked, in my opinion, at every possible way of doing it. In the final analysis, it really is the judgment of the people involved. There is never just one way of doing anything. But the collective judgments of the people who have been involved in this have come up with the present plan to establish a nonprofit organization which, for lack of a better name, we will call corporation "A."

(The subcommittee was later informed that the new corporation was named the "Aerospace Corp.")

PERSONNEL FOR NEW CORPORATION

General SCHRIEVER. I have reasons to believe that we can establish—and we are doing this—the right climate: a board of trustees of individuals who will have prestige and stature in the country, and an outstanding man for the operating head. From the years that I have spent on the west coast in very close association with the people in STL, I have every reason to believe that we will get very many key people into the new corporation on which to build over a relatively short period of time during the transition the kind of organization we need to continue.

Mr. HOLIFIELD. Would these people be full-time workers?

General SCHRIEVER. You mean——

Mr. HOLIFIELD. You are not speaking of an advisory committee?

General SCHRIEVER. Oh, no.

Mr. HOLIFIELD. You are speaking really of a working board?

General SCHRIEVER. Well, the board would be a board of trustees, it would not be a full-time operating organization; no, sir. It would be a policy board and not an operating board, as such.

Mr. HOLIFIELD. What functions would they perform in relation to the functions that were originally performed by Ramo-Wooldridge?

General SCHRIEVER. Well, the board would establish the policy for the organization, it would certainly, during the organizational phase, spend a great deal of time in the details of the organization, itself; it would assist in getting the kind of people in the corporation that are required.

NUMBER OF TECHNICAL PERSONNEL

Mr. HOLIFIELD. How many people do you anticipate would be in this new nonprofit corporation?

General SCHRIEVER. Well, initially——

Mr. HOLIFIELD. That would be on full working time.

General SCHRIEVER. You mean the actual corporation, itself?

Mr. HOLIFIELD. Yes.

General SCHRIEVER. Well, as we visualize the functions of this corporation—I might point out that one of the major problems that we have had during the past several years is that we have not been able to build up the technical staff that we consider essential for the direction, the detailed technical direction that we think is necessary in our military space programs. This would be one of the first capabilities that we would build up in addition to assuming the advanced planning function, the function of evaluating contractor proposals, plus the overall administrative responsibility for the complex out there.

These functions would be assumed immediately in the new corporation. The technical monitorship, the staff support of the Air Force in technically directing its programs, I would put first priority in building up a technical staff to assist in the supervision of our space programs.

Then as we phase in, and STL begins to phase out, as we explained this morning in the area of systems engineering and technical direction, we would build up a technical staff to assist the Air Force in the continued technical monitorship of the ballistic missile programs.

Mr. HOLIFIELD. This would be a civilian corporation?

General SCHRIEVER. This would be a civilian corporation.

Mr. HOLIFIELD. It would be free from the pay regulations, the so-called classified pay scales and civil service limitations, and you would be able to recruit people of competence whom you need for this job, is that right?

General SCHRIEVER. We believe that we would be able to do that. I am firmly convinced that we would be able to do that because of the very important job that needs to be done. The motivation for people to enter into this kind of work is very great, and particularly when it is so closely associated with things that are of such urgent importance

to the country. I think there is no question but that we would get the quality of the people that we would need.

Mr. HOLIFIELD. I don't think you responded to my inquiry as to about what size you think this organization would be.

General SCHRIEVER. The size? I was going to say that. We are planning now that during the first few months that we would have—and I will give you the scientists and engineers, and I can give you the number of overhead or administrative personnel, too, if you would like that.

Mr. HOLIFIELD. That is not as important as the scientists and engineers, the people that would do the technical evaluation and direct planning work.

General SCHRIEVER. The initial staff that we think we would build up to and we feel quite certain that we could recruit from the STL organization is about 350. Now, as I visualize it—and this, of course, is something that can't be categorically stated——

Mr. HOLIFIELD. No.

General SCHRIEVER. In specific terms, but in view of the magnitude of the program—and one must remember that we are really just crossing the threshold in this rocket age, and the space systems of the future will play a very important role, as well as the ballistic missile programs—I would visualize that the organization will eventually have a thousand, at least a thousand people in it, of the scientists and engineering category.

NUMBER OF STL PERSONNEL

Mr. HOLIFIELD. The old STL group had about how many?

General SCHRIEVER. We have right now about 1,500 of this category in STL.

Mr. HOLIFIELD. Would the so-called STL group decrease in number, or would they remain about the same and would this be an additional increment of personnel?

General SCHRIEVER. No. They immediately start decreasing in number as we assume these functions. Then, as they phase out of the systems engineering and technical direction role, the size of their organization would depend entirely on the new work that they might get, which might or might not be associated directly with the ballistic missile program.

Mr. HOLIFIELD. Of course, in making that statement you are not taking into consideration, I would think, any increased mission for Minuteman or the other existing programs, are you? Would the STL part tend to increase in the Minuteman field, or would the work there be——

General SCHRIEVER. The STL staff that is now associated with the Minuteman program—I am talking—first, of all, my answer was related to the total STL staff.

Mr. HOLIFIELD. Yes.

General SCHRIEVER. The numbers of personnel required by STL to carry out the systems engineering and technical direction of the Minuteman program is still on the rise, and probably would continue to rise for another year or so.

Mr. HOLIFIELD. But it would go down on the Atlas, possibly?

General SCHRIEVER. It would go down on the Atlas, it would be——

Mr. HOLIFIELD. How about the Titan?

General SCHRIEVER. The Titan would remain about level, because, as you know, we have a so-called Titan II program, which introduces a noncryogenic fuel, and the Titan program will require very active systems engineering and technical direction for several years. But they will drop off immediately in the area of advanced planning, in the area of evaluation of contractor technical proposals, technical staff assistance to BMD. They go down to practically zero in this area just as quickly as we can get them there, which is——

Mr. HOLIFIELD. And the new corporation would build up because they would have the function of advanced planning——

General SCHRIEVER. Staff assistance to the Ballistic Missile Division, technical monitorship of the space programs—in this area the STL provides us with limited staff assistance. They do not have systems engineering and technical direction of, say the SAMOS program, the MIDAS program, the Discoverer programs, and we would build up an increased capability for technical supervision of those programs in which we feel that we have a little weakness.

HARDWARE BAN ON NEW CORPORATION

Mr. HOLIFIELD. Would this new corporation be completely divorced from all hardware production?

General SCHRIEVER. Yes, sir.

Mr. HOLIFIELD. It would exercise strictly an objective and technical function of advanced planning, evaluation, monitoring and so forth?

General SCHRIEVER. Yes, sir. There is one other thing——

HARDWARE BAN ON STL

Mr. HOLIFIELD. How about the hardware ban on the old corporation, the STL; would there still be the hardware ban on them that existed before?

General SCHRIEVER. On those programs in which they continue to have systems engineering and technical direction the same ban continues, in work related specifically to those programs, yes, sir.

Mr. HOLIFIELD. Well, are there any new programs in which they might function which would not have the hardware development or rather the hardware production ban?

General SCHRIEVER. I can't—no, sir, I don't know of any at the moment. Any new work that they would get would be strictly on a competitive basis, and on a different arrangement with relationship to the Air Force than the present one.

Mr. HOLIFIELD. So we are really faced with a continuation of the programs which are now under contract on the basis of the old STL arrangement?

General SCHRIEVER. And only as it relates to the systems engineering and technical direction aspects. Then the experimental work or the experimental projects which they are doing directly for the NASA, in other words, for the——

Mr. HOLIFIELD. For another group?

General SCHRIEVER. For another group, yes, sir.

NEW CORPORATION TO DO GOVERNMENT WORK ONLY

Mrs. GRIFFITHS. Is this corporation going to be able to undertake other work for private industry?

General SCHRIEVER. Which corporation is that?

Mrs. GRIFFITHS. The new one.

General SCHRIEVER. Not for private industry, no.

Mrs. GRIFFITHS. Are the individuals going to be hired as consultants?

General SCHRIEVER. For private industry?

Mrs. GRIFFITHS. Yes.

General SCHRIEVER. No.

Mrs. GRIFFITHS. Now, as distinguished from the corporation, itself, once the individual has accepted employment with the new nonprofit corporation, then he cannot be hired for a fee outside that as a consultant to private industry?

General SCHRIEVER. I would think definitely not. This is not——

Mrs. GRIFFITHS. I would think——

General SCHRIEVER. I would think definitely not.

Mrs. GRIFFITHS. I would think that you definitely better put that into the contract of employment.

General SCHRIEVER. This hadn't occurred to me, but obviously this would be out.

Mr. HARDY. Currently can STL do any business other than its business with the Air Force?

General SCHRIEVER. Currently, STL is doing business other than with the Air Force.

Mr. HARDY. With NASA?

General SCHRIEVER. With NASA and ARPA, but it is through our control. I mean it is managed through the Air Force, although they do it for these other agencies. They are Government agencies.

Mr. HARDY. Government agencies, but it is still under your control, so to speak.

General SCHRIEVER. Under our management, yes, sir. But we don't give them technical direction in these areas. That comes from these other agencies.

(The following statement was submitted later:)

STL also has been performing a propellant study for the Navy under a Navy contract which has run since before the separate incorporation of STL.

HARDWARE BAN ON STL

Mr. HARDY. Now, STL is not permitted under this present arrangement to go into production on any items for sale to the Air Force or otherwise, is that right? They are not producing anything?

General SCHRIEVER. They are not producing anything, and they have not stated that they intend to be a production outfit. As a matter of fact, they have stated just the opposite.

Mr. HARDY. Well, they are not permitted under present conditions to service any other organization, other than these Government agencies which come under Air Force control, more or less?

General SCHRIEVER. No, sir. There is no prohibition against their working for any other agency than the Government, but they don't at the present time, and we would very closely scrutinize this. I would

say it is unlikely that they would work for any other agency under the present arrangement. They never have.

Mr. HARDY. But under your projected contract with STL, they would be free to do business with any agency of the Government and even with the Air Force; is that right?

General SCHRIEVER. That would be right, but let me say this: that we must be expected to exercise good judgment and propriety.

Mr. HARDY. How are you going to control the exercise of good judgment by STL? You would have a contract with them, presumably you are going to have a contract with them?

General SCHRIEVER. We can control certainly what business we would give STL.

Mr. HARDY. Of course you can do that. Having given STL a contract, if you have done it under conditions which make possible their employment for others, and even with other agencies of the Government, of course, you could control—I don't know whether you could or not. If you have a contract on a major weapons system other than ones that STL is working on for the Air Force, say you have a general contractor, are you telling us you are not going to permit that general contractor to utilize any of the services or production which STL might produce; is that what you are saying?

General SCHRIEVER. Well, STL is not permitted under the present arrangement to do any production at all.

Mr. HARDY. I understand that. But you are proposing to release STL from that prohibition when you set up this corporation; isn't that correct?

General SCHRIEVER. This is for new business that is completely disassociated from the ballistic missile and space business that they are working on for the Air Force at the present time. In other words, it would have to be unrelated business.

Mr. HARDY. How do you control that?

General SCHRIEVER. Well, how do we control it? We certainly can control it, as far as the Air Force is concerned.

Mr. HARDY. On your direct contracts you can.

General SCHRIEVER. Yes.

Mr. HARDY. Of course, I suppose you can control it with any other prime contractor where you have to approve his contracts, but then you have an exception in a great many of your major weapons systems with your prime contractor, you have an exception which permits contracts in some cases up to $1 million, which you don't even look at. Now, is Space Technology Laboratories going to be permitted to do business with other prime contractors up to $1 million, which is your cutoff point, on some of them?

General SCHRIEVER. This we have not—I am not able to say at the present time.

Mr. HARDY. It looks like to me there is a whole lot of things in here that are left wide open.

General SCHRIEVER. Well, I don't think they are wide open, because the final arrangements with respect to STL in terms of the restrictions on them have not yet been specified in detail. I think maybe Mr. Golden could talk to that particular point.

Mr. HARDY. That would be fine, I would like to have Mr. Golden address himself to that one. [Laughter.]

Mr. GOLDEN. I believe you are talking about the three programs for which the old STL is going to retain systems engineering and technical direction, that is, Atlas, Titan and Minuteman. Now, we have restrictions on TRW/STL today against taking so-called hardware contracts which originate from those programs, that is, hardware contracts directly related to Atlas, Titan, and Minuteman. We also have the same restrictions with respect to subcontracts under those three systems.

Our experience in the past—as a matter of fact, since the prohibition has been in effect beginning in 1954—has been that our ability to control it has been excellent. This committee so reported.

Mr. HARDY. That is what I am not sure of.

Mr. GOLDEN. Well, I can only report what the committee reported and which they investigated thoroughly.

Mr. HARDY. I am not criticizing what the committee said.

Mr. GOLDEN. Now there is——

Mr. HARDY. And I don't blame you for hanging your hat on it wherever you can. [Laughter.]

I think maybe you got a few pegs in there that maybe I should try to soften a little bit so they wouldn't be so available——

Mr. GOLDEN. This is a fine committee. [Laughter.]

We see no different problem involved; as a matter of fact, it will be a lesser problem to control that prohibition in the future because——

Mr. HARDY. That is what——

EXCEPTIONS TO HARDWARE BAN

Mr. GOLDEN. Just one enlargement of that. There will be only these three programs. They cannot accept or compete for contracts under those programs as primes or subs. This will continue after this splitoff, except, as we reported last year, with the approval of the Secretary of the Air Force. Now, it has worked well for 6 years; we see no reason why we won't be able to control it in the future.

Mr. HARDY. I've got my fingers crossed on how well it has worked for 6 years, but that is another matter.

Mr. HOLIFIELD. I think the chairman of the committee that made the investigation might at this point say that we investigated this very thoroughly. The gentleman from Virginia may or may not be aware of the extensive hearings we held. We found there was only one instance of hardware production——

Mr. ROBACK. I believe there were two.

Mr. HOLIFIELD. Two? And that was the use of a special type of——

General SCHRIEVER. Instrumentation by Arma.

Mr. HOLIFIELD. Tabulating machines.

Mr. GOLDEN. Yes, sir.

Mr. HOLIFIELD. And this was cleared—it was the only kind in existence, it wasn't obtainable anywhere else—it was cleared with the Secretary of the Air Force and it was a very minor thing, momentarily or any other way.

Mr. HARDY. I am sure that was so. And I am not speaking so much in terms of the specific items produced. And the fact that it

was cleared by the Secretary of the Air Force doesn't necessarily help it too much, in my book. But I don't think it is very important. [Laughter.]

Mr. GOLDEN. It is very important in our book. [Laughter.]

Mr. HARDY. I can appreciate that.

Mr. HOLIFIELD. I might say the gentleman is hard to please. [Laughter.]

Mr. HARDY. But the real meat in the coconut gets back to this very thing that we were talking about this morning, that the whole objective here is to try to create some sort of a system which will prevent some of the talking that has been going on and some of the aura of suspicion that has grown up in some quarters and get the monkey off your back so you don't have to spend so much time explaining that actually STL is a very fine outfit and there isn't anything wrong with the way they operate.

Now, that suspicion is going to continue, in my judgment, under this arrangement, and I don't see where you have done a thing in the world to improve it.

Mr. GOLDEN. Well, we have considered five or six arrangements in the past, and it is just the collective judgment, as General Schriever said a few minutes ago, that this one will give you as complete objectivity as you ever can get in any of our military programs.

INSIDE INFORMATION

Mr. HARDY. I am not sure that is so, but anyway that is not the point at issue at the moment. The thing I am trying to analyze is this question of what really is the problem that you are trying to deal with and what have you done that is going to improve that situation? The making of products isn't what has been fussed about, the two or three items that were involved that the chairman mentioned a moment ago. The thing that has been troublesome has been the allegation that actually STL people were privy to information which the industry generally didn't have and that it gave advantage to STL's affiliates. Isn't that in essence what the problem has been?

Mr. GOLDEN. As has been testified, it is part of the problem. And I might say—I think in great part it is unfounded, but——

Mr. HARDY. Whether it is founded or not.

MOTIVATIONS OF PRIVATE CORPORATION

Mr. GOLDEN. As with many things when you are dealing with Government, as distinguished from private industry, the appearance, whether it is right or wrong, looms very large. You have been through several hearings on this and you know that. We have always recognized that this would create problems; that is why we put hardware bans on this company. We have recognized that private corporations have aspirations, greater aspirations than they think they have when they start out. This private corporation has mushroomed. It has obligations to stockholders, to people investing in it, it is getting bigger.

I might say, in a sense, the Air Force found it a very convenient place to put very important projects. Now, the company wants to expand further. While it was at a stage where its effort was almost

totally Air Force effort—and that is the way it will work, where we can work side by side and not dilute its efforts in other areas—it works fine. But somehow, once you start a private corporation, you are unable, unless you have all the stockholders in your pocket, to control its growth.

Mr. HARDY. I don't think you can, I don't think you should.

Mr. GOLDEN. And this is our problem.

Mr. HARDY. Actually, I recognize the problem, and while I may not express myself in a manner that is particularly indicative of trying to evolve a satisfactory solution, that is what I am really thinking about, and I am not sure that the way you are headed will really accomplish anything. You can't stifle a private corporation. A private corporation is created for profit. That is what you would expect Space Technology Laboratories to do, that is what Ramo-Wooldridge was organized for, and of course they have obligations to their stockholders.

Now, I don't want to see the Air Force get in the position of putting up a whole lot of taxpayers' dollars to pay for something a couple of times, set up a new corporation, a straw corporation is what it amounts to. It is a device to create a subterfuge, in effect, because you are not going to do a thing in the world except get around the corporation control act, so you can pay more money.

Mr. GOLDEN. You are really doing two things. We said there were at least two problems we had, one was this objectivity problem about which there has been criticism.

Mr. HARDY. You can't change that.

CONTROL OF NONPROFIT CORPORATION

Mr. GOLDEN. You can, in the sense that, where you have a nonprofit corporation which does not have the aspirations that a stockholding corporation has to produce, to expand, to get in the hardware business, reduce the chance of lack of objectivity down to the irreducible minimum.

Now the second thing, the second problem we talked about was the question of growth. Similarly, a nonprofit corporation which will be doing business primarily with the Air Force, with the defense effort, and without production aspirations, without obligations to stockholders, will be able to be contained.

Mr. HARDY. You eliminate those only insofar as the return on investment is concerned, you don't eliminate those factors insofar as the incentive of the individuals who are running the corporation are concerned. I am talking about the people that are working in there, the officers working are going to have the same desire for personal aggrandizement and buildup to expand their own capabilities as they have in a private corporation.

Mr. GOLDEN. There is quite a difference, again, in hope and aspiration and desire to expand, between the officer who works for a salary and who likes the kind of work he is doing, and the stockholder who doesn't work for the company, but who doesn't care how they do it, so long as he gets his dividend at the end of the year. He isn't going to go for a contained business.

Mr. HARDY. I don't want to pursue this, but you know this as well as I do, that the officers and directors run a corporation, and actually it is your officers that are the cornerstones around which the enterprise revolves, and unless they have incentives, you are going to miss the drive which made Space Technology Laboratories amount to something, the people that were running it. Now, you are going to try to substitute a committee.

Mr. HOLIFIELD. It just so happens the gentleman is completely wrong. The Atomic Energy Commission development program has functioned through nonprofit universities contracts, with Berkeley, Livermore, and Los Alamos, which function on a salary basis through a nonprofit corporation, and the development of our atomic weapons has come about under exactly that program.

Mr. HARDY. That is correct——

Mr. HOLIFIELD. This is a nonprofit corporation and the incentive in a nonprofit corporation must, within any open bounds, be confined to that of getting a program done and its allegiance will be to those who pay its salary. Now, admittedly, any human being in the university or anywhere else can owe secret and double allegiance and can reveal information that he should not reveal. This is something that no type of a situation, even being a Member of Congress, can stop. [Laughter.]

Mr. HARDY. It might encourage it. [Laughter.]

Mr. HOLIFIELD. But setting up a nonprofit organization to do the top-level thinking, and planning and evaluation of technical programs, as this committee recommended and recognized, is probably the only way that you can pull this together, unless you want to condemn the complete effort and set it over into a prime contractor organization, such as have built many of our weapons systems, or a university proposition, which would be very similar to this nonprofit corporation. The Rand Corp. is a nonprofit organization.

Now, you have to make your choice. And the attempt of the Air Force, to divorce that part which it can divorce into a nonprofit organization, is completely in line with this committee's recommendation, as far as it goes. If the gentleman knows a better solution, let him place it on the record.

Mr. HARDY. Just let me make this observation about that. I am extremely thankful that I don't have to make this decision. It is not up to you or me. It is the Air Force's decision, and they have to make it. The only thing I am trying to do here is to point out as I see them some questions that are involved. Maybe this proposal won't make the situation any worse, but I am not sure it is going to make it any better. I want to make this comment about our nonprofit corporations that you mentioned.

You mentioned the Atomic Energy Commission. If we are operating on the basis only of getting a job done without regard to what it is going to cost to do that job.

Mr. HOLIFIELD. This missile program is the No. 1 priority in the Nation.

Mr. HARDY. I am perfectly willing—I am accepting that as a fact to start with, that it is the No. 1 priority. But I don't think that it behooves any of us to forget the cost factor. When you bring up AEC, yes, AEC has done a good job, but you haven't got

one earthly thing to compare that performance with because there isn't anything comparable to it.

Neither have you got anything to compare the performance of the STL with, because there isn't anything to compare it with. You can bring together all the combinations you want, but you can't have any check on costs when you have nothing to compare it with. When you set up this corporation arrangement—and I am not certain whether it ought not to be set up, I don't know whether there is a better solution or not—but I frankly say I don't see where it improves the situation you have today.

CONTROL OF PERSONNEL

Mrs. GRIFFITHS. The thing I can't understand is why don't you hit it head on, why don't you come in and say "Look, we just have to have some people in Government that you can't get at the price you are now getting, and we have to be able to pay them and hire them and put them in the Government"?

I think one of the real questions you are going to hit in this nonprofit corporation, Who is going to be able to fire these people? You aren't, are you? It is a corporation. You have an agreement with a corporation, don't you, a contract?

Mr. GOLDEN. Yes.

Mrs. GRIFFITHS. And you cannot determine the hiring and firing policies of that corporation; right?

Mr. GOLDEN. Well, Mrs. Griffiths, you know this will be no different from any contract we have with any contractor, nonprofit or profit. You are familiar with this business.

Mrs. GRIFFITHS. That is right.

Mr. GOLDEN. And you leave up to the corporate management the job of running their corporation; to a degree, as Mr. Hardy knows, we have been getting into some of their business. I can assure you that the type of people that are going to be on the board of directors—they generally call them trustees in a nonprofit corporation—are the kind of people that won't tolerate that thing. We have precedent in this area, although not for this particular function. We have a Rand Corp. and you know the marvelous work they have done. We have this kind of situation, and so do the other services in other areas, for defense development work. What you do is insure that you get the right board of directors, men of stature, and even more important, that you get the right operating head and the key people under him.

I can assure you that the problem of hiring and firing is not going to be a great one.

Mrs. GRIFFITHS. Well, I think you feel that way now, but wouldn't you think we could appoint FCC Commissioners in this Nation that had sense enough not to go out with the people that were involved before them? [Laughter.]

But we don't have. We are always worrying over this problem.

Now, at the present time, everybody stands in awe of these people who understand something about space. But about 10 years and that awe is going to be gone. You are going to realize that these people are human, they have friends, and you are going to have complaints all over from industry that they are getting a rough deal.

So you are again going to be questioned on who are these people going out with, how many private deals do they have on the oustide and so on.

Mr. GOLDEN. Mrs. Griffiths, this committee has seen it happen. It has happened from time immemorial. You can read the cases way back to the first law book and find conflict-of-interest cases.

Mrs. GRIFFITHS. Of course this is a question. The real question is I think in some way that you realize, now, that in place of ending the criticism you are going to open up a new avenue of criticism.

Mr. GOLDEN. Actually, having considered the five or six plans that we went through, and the variations of them, I do think that this nonprofit arrangement will best do the job that we have to do and will result in the least criticism.

I would give this approach a mark much higher than our normal, traditional way of contracting today, where you have the single prime contractor to whom you give the total dollars and he places the subcontracts.

One good thing, as this committee reported last year, is that under this system the Air Force places the prime contracts for these very important chunks of these systems.

Mr. HOLIFIELD. The Air Force, itself, does the contracting?

Mr. GOLDEN. Yes, sir.

SALARY LIMITATIONS

Mr. HOLIFIELD. Now let me just interrupt the gentleman at this point. If the world were new and we were starting from scratch, all of us would have the exact perfect solution although each might differ a little bit, but we face this problem as it exists.

As a matter of fact, Mrs. Griffiths, the Congress will not pass laws which allow them to pay higher salaries. So, they start with that fact, that they can't pay salaries above a certain amount directly, because the Congressmen feel that nobody in the world should make more than $22,500 a year. [Laughter.]

So we start with that basic problem. Now, they will make a statutory exception for 10 positions at a certain level, maybe, but they won't make a statutory provision that is wide enough to employ the men that are necessary.

Now, let me point out that the scale of salaries paid in the Ramo-Wooldridge Corp., and the scale of salaries which will undoubtedly be paid in this new nonprofit organization will not be commensurate with the scale of salaries that are paid in General Electric and in Lockheed, Douglas and General Motors, and all of those are included in the cost of the product they sell to the Government.

Mr. HARDY. Why wouldn't you pay salaries along in that line?

Mr. HOLIFIELD. The gentleman knows that you can't get that kind of legislation through Congress.

Mr. HARDY. You mean if you are going to make them pay it out of the Federal Treasury directly? That is a subterfuge to get around it.

Mr. HOLIFIELD. Well, wait a minute. It is easy to name something as a subterfuge——

Mr. HARDY. Well, isn't is?

Mr. HOLIFIELD. It is a method, but the prime contracting of a Lockheed Lodestar with the Lockheed Corp. includes in the cost of that product maybe $150,000—I don't have the figure at my fingertip—that is paid to the president of that corporation.

Mr. HARDY. That is right; it sure does.

Mr. HOLIFIELD. So this committee's examinations, at least, have found that corporate salaries of companies that were handling prime contracts for the United States were much higher than the corporate salaries that were paid in this particular instance. Now I am not saying that they were justified. Perhaps they were not justified.

Mr. HARDY. Let me ask you something. I think that is a factual observation. But did you make any comparison of the corporate salaries that were paid on the basis of major business being done under negotiated Air Force contracts?

Mr. HOLIFIELD. You mean the negotiated contracts with Lockheed?

Mr. HARDY. Yes.

Mr. HOLIFIELD. Or with Douglas?

Mr. HARDY. Well, you picked a couple of good ones, because most of their business is with the Air Force.

Mr. HOLIFIELD. We are not on the subject——

Mr. HARDY. I understand——

Mr. HOLIFIELD (continuing). Of that, but I do know what the corporate salaries of some of these people were in comparison to the corporate salaries——

Mr. HARDY. They are high.

Mr. HOLIFIELD (continuing). In a nonprofit organization such as Rand and such as I understand that this organization will be.

Mr. HARDY. They are high.

Mr. HOLIFIELD. I think we ought to look at the whole picture as far as salaries are concerned.

Mr. HARDY. Were you there?

General SCHRIEVER. Mr. Chairman.

Mr. HOLIFIELD. Go ahead.

General SCHRIEVER. I would just like to put something into the record here—you should never volunteer, but I can't help it.

Mr. HOLIFIELD. We are having a provocative session. Go right ahead. [Laughter.]

CRITICISM INEVITABLE

General SCHRIEVER. Well, I would like to make it very clear that the primary consideration, as far as the Air Force is concerned, relates to the urgency which we attach to the job that we have got to do for the country. We have used our very best judgment in the plan we have come up with, and we think that this best serves the urgency of the situation.

With respect to the matter of criticism and harassment, I can assure you that in 1954, when I was sitting with the group who were planning to do this job, we recognized before we even started that we were going to be criticized and criticized plenty, because, if for no other reason, it was a change, and any time anything is a change, you are going to be criticized. That is just human nature. But we went into it with our eyes wide open and we did it because we felt that the urgency of the situation demanded it. And if you read——

Mr. HOLIFIELD. Well, as a matter of fact, you were directed by the Secretary of Defense to go into it as the result of Committee consideration of the methods by which your mission could be attained.

General SCHRIEVER. Yes, sir.

Mr. HOLIFIELD. In other words, these two committees, the Von Neumann Committee and what was the name of the other one, the Gardner Committee——

Mr. GOLDEN. Strategic Missiles Evaluation Committee.

General SCHRIEVER. Later there was the so-called Gillette Committee.

Mr. HOLIFIELD. The Gillette Committee, that is the one I was seeking. They recommended this method of approach and you were ordered to follow this line of approach.

RESPONSIBILITY FOR MANAGEMENT ORGANIZATION

General SCHRIEVER. But I might point out that the exact nature of the management organization to do the job was not spelled out by the Von Neumann Committee. I was given the job after we established the field organization on the west coast of coming into the Pentagon with a detailed management scheme, which was then presented to the Von Neumann Committee, which, incidentally, at the stage of the game had no membership by either Ramo or Wooldridge. I am the one that takes full responsibility for recommending this particular plan.

It was submitted to the Committee, and it was also submitted to the Secretary of the Air Force through the commander of ARDC and the commander of AMC. They all concurred in this method of management which was formulated in August of 1954.

Now we recognized that it was a departure, but we all felt it was a necessary departure in order to expedite this very urgent program. So I think it is wrong to leave the impression that we are simply making this change to try to avoid criticism.

Certainly we are trying to do the job right, and we are trying to reduce the criticism to the maximum extent possible. But the main motivation still is to get the job done. In this connection, it is entirely likely, in my opinion, at least, that we will get the kind of people we need simply because the motivation will be there—because these people recognize the urgency of the job, too. And this is what really was underlying the whole initial organization, both in the minds of the military people and of the civilian people.

I might say that I didn't lose a single military officer for the first 4 years that I was out there. And many of them could have gone to industry for jobs, with three or four times the salary they were getting in the military.

Mr. HOLIFIELD. And the Government would have paid it, too, because they would have gone into defense industry and it would have been included in the price of the article.

General SCHRIEVER. So this business of motivation ranks very high, if the people know that they are doing an important job and if also there is a reasonable amount of appreciation for the job that they are doing.

Mr. HOLIFIELD. I would like to call on the next witness, Mr. Roback, and give him the privilege of entering the official list of witnesses. Will you develop a line of inquiry for the committee?

Mr. ROBACK. I will promise not to indulge in hypothetical or speculative disquisitions. I will also, at the risk of a little repetition, because the record this morning was confused, again ask questions and ask the witnesses to confine their answers to the point; and in cases where General Schriever or Mr. Charyk does not know the answer, I will call upon their backup witnesses, including Colonel Bishop and Colonel Boatman. I want to establish the sequence of events so that the committee can understand what happened, to lay a foundation for evaluating this new corporation that we are confronted with.

FIRST STUDIES OF FUTURE ORGANIZATION

Mr. ROBACK. Now, is it the case that you examined the future organization of STL in extensive studies conducted during 1957 and 1958, General Schriever?

General SCHRIEVER. Yes; that is right.

Mr. ROBACK. Now, is it the case that when the sputnik issue arose right after the end of 1957, your studies which had already been underway were suspended?

General SCHRIEVER. I had a study group, I had set up a study group which had representation from both the Ballistic Missile Division and the Ballistic Missiles Center.

They were never officially suspended. However, in——

Mr. ROBACK. Interrupted, would that be a fair statement?

General SCHRIEVER. They were interrupted. As a matter of fact, Colonel Boatman was a member of that committee. He might remember it a little more vividly than I do. I just don't recall exactly what happened right after sputnik.

Mr. ROBACK. Was there a suspension or interruption of the studies after sputnik?

Colonel BOATMAN. No, sir: there was not a suspension, there was an interruption because the advent of sputnik created many more urgent problems. With our staff overburdened with the work we already had, we had to get on with the more urgent task, which was: What do we do about sputnik?

STUDIES RESUMED

Mr. ROBACK. Did you resume or intensify these studies about the time or after this subcommittee held hearings?

Colonel BOATMAN. We were in full swing before your subcommittee held its hearings.

If you will recall, during the initial meeting that Major Brower and I had with you and Mr. Morgan, I believe here in this room, I described to you the nature of the studies that we were carrying out at that time, when we had a full committee action by a group of colonels working on this problem.

Mr. ROBACK. At that time was it concluded that STL should become a special purpose, nonprofit corporation?

Colonel BOATMAN. No. We didn't come to the conclusion that it should. There was a feeling, among some of us on the working group, that this was a good idea, but we also realized that you couldn't make

this transition in the time period we were then considering without disruption of vital work.

We reported to General Schriever on this, and we continued studies of the advantages and disadvantages as to the several routes we could take.

Mr. ROBACK. What kind of a plan evolved from these studies?

Colonel BOATMAN. I don't believe I follow the question.

DIVESTITURE RECOMMENDED

Mr. ROBACK. What kind of a plan for STL's future evolved from these studies? Did you have a proposal that was submitted to General Schriever which he in turn submitted to the Air Force?

Colonel BOATMAN. Yes.

Mr. ROBACK. What were the basic outlines of that plan?

Colonel BOATMAN. The plan at that time, in order to cause a minimum disruption to the programs we were carrying out, called for a divestiture of the Space Technology Laboratories from Ramo-Wooldridge.

Mr. ROBACK. Divestiture?

Colonel BOATMAN. Yes.

Mr. ROBACK. Divestiture was the basic thought? Will you date that, Colonel Boatman?

Colonel BOATMAN. I believe that General Schriever reported to General Anderson on that about April of 1958.

Mr. ROBACK. At that stage of the game the main consideration was divestiture?

Colonel BOATMAN. Right.

Mr. ROBACK. Not nonprofit?

General SCHRIEVER. That is right.

STL AS SUBSIDIARY RESULTED

Mr. ROBACK. What was TRW, which was the merged corporation of Thompson Products and Ramo-Wooldridge, what was TRW's response to the issue of divestiture?

General SCHRIEVER. Well, I can answer that. TRW didn't exist just at that particular time. The step which was taken was the establishment of STL as a wholly owned but separately incorporated division.

Mr. ROBACK. That was a partial response by Ramo-Wooldridge?

General SCHRIEVER. That was a partial response. Then there was a series of meetings, and at some point—and I would have to check the record as to when meetings were held between the Secretary and TRW to discuss this divestiture problem. A number of different approaches were looked at.

I think that Mr. Golden could probably supply the dates on this.

The nonprofit approach did not appear during this particular phase of the negotiation. It was just concerned with the divestiture.

Mr. GOLDEN. I believe it was in August of 1959 that we had a rather formal meeting with the top people of TRW and STL to consider this divestiture business.

FIRST NONPROFIT IDEAS

Mr. ROBACK. When did the proposal for a nonprofit corporation first make its appearance as a matter of policy?

General SCHRIEVER. I think it was after the Holifield committee report, because I know that I had not made any specific recommendation with respect to nonprofit—or whether it be profit or nonprofit before that time.

Mr. ROBACK. Then the Millikan Committee was established to consider the whole range of problems involved; is that correct?

General SCHRIEVER. This is right.

Mr. ROBACK. Who selected the Committee?

General SCHRIEVER. The Secretary.

Mr. ROBACK. Secretary of the Air Force?

General SCHRIEVER. Yes.

Mr. ROBACK. Did you make any recommendations, General Schriever, as to its membership?

General SCHRIEVER. I discussed it with the Secretary. We had several discussions. I do not believe I made any recommendations in writing, but I did discuss names with him; yes, sir.

Mr. ROBACK. Is it your testimony that prior to the formation of the Millikan Committee there was no plan presented, formulated or considered for a nonprofit corporation?

General SCHRIEVER. Briefings had been made, but no formal recommendation had been made to the Secretary that it be nonprofit. As a matter of fact, however, Colonel Bishop made briefings which indicated that this might be a desirable course. But this had not been submitted to the Secretary level as the course that we thought was best.

Mr. ROBACK. In view of the fact that the Millikan committee did not specifically recommend a profit or a nonprofit corporation, it didn't take a position on that issue, how did the issue of a nonprofit corporation come before the Secretary and be considered by, among others, TRW? How did the issue come up? The Millikan committee didn't advise you on that matter.

General SCHRIEVER. No. There was a series of meetings which the Secretary called at which this whole matter was discussed, as to just what the nature of the corporation should be. The matter of profit versus nonprofit was discussed at great length, and, although I don't recall the exact timing, I did eventually make a recommendation that it be nonprofit.

Now, I don't mean to say that my recommendation was the thing that decided the issue, because there were many, many discussions of this. I just want to be responsive, in that I did at one point, which was after the Millikan committee report was filed, make an official recommendation of a nonprofit corporation.

TRW POSITION ON NONPROFIT

Mr. ROBACK. When you made that recommendation, did TRW participate in discussions with you or afterward at the Secretary's level?

General SCHRIEVER. TRW was not involved in these discussions. They were involved in discussions later.

Mr. ROBACK. Now, Mr. Charyk, are you informed about what TRW's position was with respect to a nonprofit corporation?

Mr. CHARYK. I think it is fair to say that TRW undertook a study of many different approaches to the problem. Colonel Bishop's presentation had included a whole series of different approaches to the problem, including the nonprofit solution.

I think that TRW's preferred solution was the public sale solution which we discussed this morning. This did not mean that their minds were closed to other possibilities and we did discuss many others.

Mr. ROBACK. What type of corporation would it have been had there been a public sale? Would that have in effect been a divestiture? What the public sale amounted to was a divestiture?

Mr. GOLDEN. Yes.

Mr. ROBACK. It would remain a private profitmaking corporation but the stock would have been transferred from present ownership.

Mr. GOLDEN. From TRW to a wide distribution, to anyone who would buy stock put out by the underwriters.

Mr. ROBACK. So while you would not then have the problem of a tie with Ramo-Wooldridge, you would still have the problem of a private corporation working in this capacity?

Mr. ROBACK. The Secretary decided that was not a desirable thing to do; is that correct?

Mr. GOLDEN. Well, actually, this came to a head in about August. This proposal for divestiture was one that TRW had considered and thought that the Air Force wanted. I think they were reasonable in concluding that this might be it, but they were very careful not to take any steps until they had talked to us. And at that time, in August, after this hearing, just to time it, the Secretary was troubled, as General Schiever was, as to what the future scope of this organization should be. He felt, and we all believed rightly, that he should not acquiesce in a public sale of stock in STL, and therefore private ownership, widely held, at a time when he and General Schriever weren't sure as to the longevity of this organization, whether it was going to continue to work for us and for how long.

EFFECTS OF DIVESTITURE

Mr. HOLIFIELD. Let's explore that point just a minute. Assume that at that time the Secretary of the Air Force had ordered a public sale of STL or a complete divorcement of STL from TRW. Now, No. 1, if it had been sold, it would have been sold to private parties and therefore there would still have been a private organization in the picture?

Mr. CHARYK. That is correct.

Mr. GOLDEN. Yes, sir.

Mr. HOLIFIELD. No. 2, the almost complete reliance of the Air Force upon this type of contract would have continued, and this would be the field in which that corporation had its competence, is that not true?

Mr. CHARYK. Yes.

Mr. GOLDEN. That is right.

Mr. HOLIFIELD. So you would not relieve yourself of a private corporation in that position?

Mr. GOLDEN. That is right.

Mr. CHARYK. Yes, sir.

Mr. HOLIFIELD. Now let us consider this. If you completely disrupted—if you sold it without providing for the continuity of the work on the Atlas and the Titan and the Minuteman—wasn't it?

Mr. CHARYK. Yes.

Mr. HOLIFIELD. And the Minuteman, then the corporation would have had nothing to do, and it would have been necessary then for you to have made some kind of an arranagement for the continuity of the research and development of those three important missile systems, is that not right?

Mr. CHARYK. That is right.

Mr. HOLIFIELD. Now, if you had not continued with the organization which you had at that time, there would have been an interruption in the continuity and therefore in your time schedule of production and development to a finer excellence of those systems, is that not true?

Mr. CHARYK. It would have had a very serious impact on the program.

Mr. HOLIFIELD. So the solution that you made—you weighed, no doubt, factors that I think of at the moment and many other factors probably that I do not think of and do not know about; and you came to the conclusion rightly or wrongly that if the program should proceed at the rate that it was going or maybe at an accelerated rate, that there must be no interruption to the continuity of the program, is that right?

Mr. CHARYK. We felt that was very important.

Mr. HOLIFIELD. And therefore you maintained the continuity of the program in those particular fields where it was in order to prevent interruption and delay in the program, is that right?

Mr. CHARYK. We felt that whatever solution was selected, continuity was extremely important.

Mr. HOLIFIELD. The alternative would have been either to have gone along much the same line with the corporation that bought the corporation, or start a completely new method of prime contracting with some outside, big industrial organization, would it not?

Mr. CHARYK. Yes.

Mr. HARDY. Couldn't you have had another alternative, Mr. Chairman?

EFFECTS OF NEW ARRANGEMENT

Mr. HOLIFIELD. So, weighing the balance between the continuity of the program and the delay which an interruption might occasion, you decided to freeze STL at that point and take away from it the—really the management function, the planning and management and evaluation function, and put it in this nonprofit corporation, is that right?

Mr. CHARYK. Yes, sir.

Mr. HOLIFIELD. And am I stating it right? Weigh my words. I may not have stated it right. You are taking certain functions away from STL, you are putting them in the nonprofit corporation. That nonprofit corporation will take care of new projects; it will have under its domination the future planning, direction, the technical evaluation of contractors, all of these—and then when a project reaches the

contracting stage, that will be done by Air Force production contractors, will it not?

Mr. CHARYK. That is right.

Mr. HOLIFIELD. But it will be done by the evaluation of this group of scientists, technicians, and experts which you build into this corporation.

Mr. CHARYK. That is correct.

Mr. HOLIFIELD. And this nonprofit corporation will be prohibited from having any contacts with hardware producing corporations. Their function will be strictly an executive function of evaluation, of planning, of stimulating the functional capacities of the various contractors that may be in the program, is that right?

EXPERIMENTAL WORK

Mr. CHARYK. Well to that I would add the fact that they will conduct experimental work.

Mr. HOLIFIELD. They will do some experimental work.

Mr. CHARYK. They will conduct some.

Mr. HOLIFIELD. Strictly in their own laboratories, in the Government's own laboratories or perhaps by contract with private laboratories?

Mr. CHARYK. That is a possibility, also.

They will also play an important role in the monitoring of our technical programs.

TECHNICAL MONITORING

Mr. HOLIFIELD. Now, by monitoring, what do you mean?

Mr. CHARYK. I would define this as including the continuous review of the progress in our various programs, with a view to determining whether new developments, new ideas might significantly affect the trend of the development.

In addition it must include the mission to recognize and take remedial actions in the event of deficiencies in the program.

SYSTEMS ENGINEERING

Mr. HOLIFIELD. And would part of their job be to coordinate the various components of a program or the various areas of a program so that they will come along at the same time and be wedded at the proper time?

Mr. CHARYK. Well, the system contractor will of course have the responsibility for bringing together all of the components and subsystems into the final article.

Mr. HOLIFIELD. That would be in the event that you granted a full weapons system to a private contractor, would it not?

Mr. CHARYK. It would.

Mr. HOLIFIELD. And you did not do this in the missile program? You had the electronic guidance program, as I remember, going along with one contractor, or maybe more, and his subcontractors; you had the propulsion program going along with another contractor and his subcontractors, and so forth. You had these, as I remember, divided into major areas of effort, all being brought along toward the common goal of marriage into a weapon system at the end?

Mr. CHARYK. That is correct.
Mr. HOLIFIELD. In the system.

LINE RESPONSIBILITY IN NEW SETUP

Mr. CHARYK. And STL, as I indicated in my statement this morning, has had a line responsibility in the program to do the detailed systems engineering and technical direction which involves tying all of these together. In a sense they have worked as the system contractor but without the hardware responsibilities associated therewith.

Mr. HOLIFIELD. I understand that. But that is in the field you have limited them to. Now does that same function of coordination obtain in these new programs which will stem from the new nonprofit corporation's ideas in research and development?

Secretary CHARYK. Well, as I also indicated this morning, the role of the new corporation in the normal situation will be somewhat different, in that they will not have a line responsibility.

Mr. HOLIFIELD. I see.

Mr. CHARYK. But they will have this technical monitoring responsibility——

Mr. HOLIFIELD. Yes.

Mr. CHARYK. After the program has been contracted, which means that we will have available to the Air Force a source of continuous technical review of all aspects of the program.

Mr. HOLIFIELD. Yes.

Mr. CHARYK. So that we can then take the actions that are necessary to insure that the technical goals are realized on a timely basis.

Mr. HOLIFIELD. All right.

Now, under the new system, where does the line responsibility come?

Mr. CHARYK. The normal procedure would be that there would be a system contractor who would have the responsibility for tying the various elements together. This does not mean that in certain situations we might choose to use an associate contractor arrangement. I also indicated in my statement that in exceptional cases we might also want to consider the advisability of having the new corporation actually do the detail systems engineering and technical direction.

This would be an exception to the normal practice as we visualize it at this time.

Mr. HOLIFIELD. All right.

Would it be fair for me to say, then, that in the field of planning and evaluation, the new corporation would function. In the field of actual management and coordination of a weapons system you would, in effect, depend upon the old method of prime contracting for the line responsibilities, or prime and associate contracting for the components of a system.

Mr. CHARYK. But modified by the fact that the new corporation will be playing an important technical review and monitoring role in the program.

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TECHNICAL MONITORING

Mr. HOLIFIELD. This is a watchdog role, you might call it. What would its purpose be?

Secretary CHARYK. Its purpose would be to insure that the best technical advice was available to the Air Force in regard to the progress of the program and potential improvements in the program, and to insure that the best available talents were brought together to accomplish the job. In other words, the new corporation will play an important role in the selection of the sub or associate contractors, and in the evaluation of their proposals.

Mr. HARDY. STL does not do that now?

Secretary CHARYK. STL does do this now.

Mr. HOLIFIELD. That is the line responsibilities that they perform?

Secretary CHARYK. Well, actually, they have the overall system responsibility. In this case the system contractor would have the overall system responsibility, but the new corporation would provide technical guidance, advice, review, and monitoring functions for the Air Force.

Mr. HOLIFIELD. And that new corporation's duties would apply to the whole scope of activity of the Air Force in the Ballistic Missile Division, is that right?

Secretary CHARYK. They would include the ballistic missile and space programs.

Mr. HOLIFIELD. They would be looking at what STL is doing. They would look at any of the new systems that might be brought into being under their sponsorship, or any other type of direct prime contracting that might occur? In other words, you might want to step out and contract with "X" corporation to do a certain job on the old method of prime contracting?

Secretary CHARYK. Right.

Mr. HOLIFIELD. Now, do I understand that this new nonprofit corporation would sit more or less as a monitoring and advisory and evaluation group over all the whole scope of the ballistic missile development?

Secretary CHARYK. That is our intent.

Mr. HOLIFIELD. That is your intent.

Now proceed.

INFORMATION EXCHANGE

Mr. ROBACK. You are including the role of supervision over STL. Do you really mean to say that, Mr. Secretary?

Mr. HOLIFIELD. From the standpoint of monitoring, I mean monitoring and knowledge of what they were doing, so you could fit it into the overall program.

Secretary CHARYK. I think it is essential that information on Atlas, Titan and Minuteman, which is going to be important to our space programs, be available, insofar as the new corporation is concerned. Therefore, I think they must have a contact with these programs.

Mr. ROBACK. I am going to ask you a question on a practical problem in that connection. The STL has developed and accumulated considerable information, the type of information which, Mr. Hardy suggested, some companies might consider a competitive advantage

to STL. Now, is there a program or a plan or an intention to schedule or organize the orderly transfer of information from STL to the new corporation or to the Air Force?

Secretary CHARYK. We have endeavored to work out the details of a program of transition which would involve functions, personnel and facilities.

Mr. ROBACK. What about information? The real question is: Does the information that STL now possesses flow to TRW, or does it flow to the Air Force? It is as simple as that.

Which way does the information flow that has been developed in the course of supervising, in very intimate detail, the programs of all the missile and space contractors under Air Force cognizance?

Secretary CHARYK. I think STL has been extremely careful to insure that there is not a flow of sensitive information to TRW.

Mr. ROBACK. I am talking now about the future. There are documents, there is cost information, various types of information recorded on pieces of paper, in big voluminous documents, studies, records, indexes of behavior of various components, all kinds of recorded information. Where does that information go as STL phases out? Does it flow toward TRW, or does it flow toward the Air Force?

Mr. CHARYK. The information that would no longer be required by STL would be transferred back to the Air Force.

General SCHRIEVER. The technical library is run by STL, but it is actually an Air Force library.

Mr. HOLIFIELD. All documents, research and development documents, depositories, are in the hands of, and are the property of, the Air Force?

General SCHRIEVER. The Air Force; yes, sir.

Mr. ROBACK. There wouldn't be any question as to who owned what, would there?

General SCHRIEVER. No, sir; we own it all.

Mr. HARDY. Does that necessarily mean that working papers wouldn't be available to STL personnel who might be separated as this thing folds up?

Certainly information which they have acquired which would be useful to TRW, whether it is documented or otherwise would be bound to flow back. I don't know as there is anything you can do about it.

Mr. HOLIFIELD. It would be bound to flow back if it was in the person's mind.

General SCHRIEVER. If it is in the person's mind.

Mr. HOLIFIELD. Or in his private working papers which he had carried and, of course, this would obtain if a man is working for Lockheed and quits the employ of Lockheed and goes to Douglas. You couldn't separate the information from his mind.

Mr. GOLDEN. More important, Mr. Chairman, if a man is working for Lockheed and supervises major subcontractors and gets information there, he takes it back with him. It is one of the things you have to live with. A person, as you said, can't brainwash himself of information.

Mr. HARDY. The major difference in this particular situation is, though, that in this STL proposition you are right at the fountain of the whole business, virtually.

Mr. GOLDEN. I think in degree it is; yes.

Mr. HARDY. In degree it is tremendously more important, and that is where the problem is acute.

CONVERSION OF STL

Mr. ROBACK. When you recommended a nonprofit corporation, General Schriever, did you contemplate that there would be a complete conversion of STL to a nonprofit status?

General SCHRIEVER. My first recommendation, and first desire if it was practical, was that there be a complete separation. That is what I would have preferred, but——

Mr. ROBACK. And you or the Air Force Secretary, who had to consider the problem, encountered at that point the resistance or opposition of the executives of STL, is that correct?

General SCHRIEVER. No; I don't think that is a correct statement. I think it is a correct statement to say that generally the executives of STL were not in favor of STL's transition to a nonprofit organization. There were other factors that were involved.

Mr. ROBACK. The other factors have been mentioned several times. Can you give us a few of those other factors? What was the problem in addition to the fact that the STL management didn't like the idea? What else was involved?

General SCHRIEVER. Well, what primarily was involved was the fact that we came to the conclusion that we could not simply order the total divestiture of STL. It was a problem involving people, and we just could not order, "Tomorrow you are going to be a nonprofit organization." The psychological effects, the morale effects, and many other things would be such that there would be a disruption of the program which we felt we couldn't tolerate.

PROPOSAL FOR TWO CORPORATIONS

Mr. ROBACK. Who originated or who came up with the idea that there would be a division of labor and at least a temporary coexistence of the two corporations? Whose proposal was it?

General SCHRIEVER. That was an evolutionary thing.

Mr. ROBACK. Was it a negotiated, I mean an offering in negotiation, say an alternative formulated by TRW, or who gets credit for the idea?

Mr. HARDY. And the criticism?

General SCHRIEVER. I am not sure that any one individual would get credit. It really was evolutionary in nature. There was, you might say, a difference of thinking on the part of certain people as to the nature of the new organization, and their proposals differed with respect to how this transition should occur, and what the functions should be.

IDEA AROSE AT SECRETARIAL LEVEL

Mr. ROBACK. Did this develop informally at the Secretary's level or did he have before him a proposal by the Ballistic Missile Division?

General SCHRIEVER. No; this developed during a series of discussions at the Secretarial level.

Mr. ROBACK. And he gave his approval to the general concept of the two corporations and the division of labor which Mr. Charyk has outlined?

General SCHRIEVER. Yes, sir.

ACQUISITION OF FACILITIES

Mr. ROBACK. Now, is it contemplated that the Air Force will acquire the buildings and the equipment and provide them as Government-furnished equipment to the new corporation?

General SCHRIEVER. That is the plan.

Mr. ROBACK. Are there remaining assets that have to be disposed of or do they stay with STL?

General SCHRIEVER. I don't believe there are any assets that have to be disposed of.

There are some facilities and some equipment that stays with STL. For example, they have a hanger on the International Airport at Los Angeles in which they actually do their assembly of their experimental vehicles for NASA. This stays with them.

Mr. ROBACK. This stays with TRW, they own that.

General SCHRIEVER. This stays with STL; yes.

Mr. ROBACK. What else stays with STL, in the context of the work they did for the Air Force?

General SCHRIEVER. In the way of facilities and equipment?

Mr. ROBACK. Facilities and equipment.

General SCHRIEVER. Would you answer that?

Colonel BISHOP. As we mentioned this morning, we haven't started the negotiations for the facilities, that is the land and buildings that are in the Research and Development Center. At the time we commence negotiations for that purchase, we will look into the entire property account, because there are other things in it that we should buy.

Mr. ROBACK. You will buy that and turn it over to the corporation?

Colonel BISHOP. Yes. Some of those things are, for instance, installed test equipment and machinery in the Research and Development Center. There are also leasehold improvements that I mentioned this morning in some of the leased buildings which we would propose to buy outright, rather than continue to amortize.

COST FORMULAS

Mr. ROBACK. Is the Government proposing to buy this at cost, acquisition cost or replacement cost or what other type of pricing?

Colonel BISHOP. The leasehold improvements?

Mr. ROBACK. Talking about both leased equipment and buildings—are there different formulas?

Colonel BISHOP. We propose to buy the equipment and leasehold improvements—anything other than land and buildings—at actual value today.

Mr. ROBACK. That is fair market value, so-called.

Colonel BISHOP. Fair market value, which would be right at actual value.

Mr. ROBACK. And that is the formula which TRW put forth and requested as a basis for negotiation.

Colonel BISHOP. Well, they have not specified their desires with respect to pricing things other than the Research and Development Center.

Mr. ROBACK. And that is fair market—did they insist on fair market value?

Colonel BISHOP. No, they did not ask for fair market value.

Mr. ROBACK. Replacement value?

Colonel BISHOP. They did not say replacement value would be the only yardstick. We discussed the matter and we agreed that we would look at several yardsticks in arriving at value, but the purchase itself would be a negotiated purchase.

Mr. ROBACK. And that has not yet been done?

Colonel BISHOP. That has not been done.

STL TO BE TENANT

Mr. ROBACK. After it is done, then will STL be a tenant for the remainder of its work for the Air Force?

Colonel BISHOP. They will be a tenant for a period of time, not necessarily during the entire period that it may take to complete the SE/TD on these three missiles. But they are considering erecting new facilities in another location and they are planning to move into those facilities.

Mr. ROBACK. And will the Air Force encourage them to physically remove themselves or to stay as long as they like?

Colonel BISHOP. Well, I think that both we and STL would like to see them in their new facilities as early as possible.

Mr. ROBACK. Will that interfere with the ready exchange of information and daily working contact which previously was considered as an asset, a benefit?

Colonel BISHOP. I don't think it will, for this reason: Today the weapon system offices for Atlas, Titan and Minuteman are located in leased facilities and in line with our minimum disruption objective, we do not plan to move those offices. If STL moves its corporate offices and some of its laboratory work, for example, that is not directly related to SE/TD on these three missiles to its new facilities, I believe they will likely want to leave those people who are performing SE/TD in the weapons system offices where they are presently located.

Mr. ROBACK. By SE/TD you mean systems engineering and technical direction?

Colonel BISHOP. Yes, systems engineering and technical direction. I would like to qualify that by saying it is not perfectly clear to either STL or ourselves today that the SE/TD job will be finished on any certain date. This is just the nature of development work. We can't tell today exactly how long it will take to finish the task. It is possible that the task may be completed earlier than we have estimated, so that the STL people, even in the weapons system offices, can also evacuate the present facilities and move to their new building.

ADMINISTRATIVE SUPPORT BY CONTRACT

Mr. ROBACK. What happens to the administrative services performed for the Air Force by STL, will they be transferred to the new corporation or absorbed by Air Force directly?

Colonel BISHOP. In the transition—again for reasons of wanting to avoid disruption—we propose to simply transfer all of the administrative support tasks to the new corporation, so that it will pick up the service-type functions for the entire complex.

They would therefore service the Air Force, their own needs, the needs of our tenant organizations, and STL.

Mr. ROBACK. You mean all that will be done on some kind of reimbursable basis?

Colonel BISHOP. Yes. Patterned on the basis that we are now operating.

Mr. ROBACK. So they will service both the Air Force and STL?

Colonel BISHOP. This is our plan for the temporary period that STL would remain in these facilities.

HARDWARE BAN

Mr. ROBACK. There was considerable discussion earlier about the hardware ban. Now is it the case that for other than the three missile systems there will be no restrictions on STL or TRW in taking on production or other type contracts?

Colonel BISHOP. I would like to refer back to Mr. Golden's testimony earlier. Would you like to talk to that?

Mr. ROBACK. The emphasis was that the hardware ban would stay. Mr. Charyk testified that the hardware ban stays for those projects with which STL is connected. Those are the three big missile programs. The question then is: For those projects which have or will be transferred to the new corporation, is the hardware ban lifted for STL so that they can take on space hardware work or new missile hardware work, if there is a new missile project?

Secretary CHARYK. Well, at such time as the Atlas, Titan and Minuteman are the only programs that are left at STL, the hardware ban would apply only to those.

Mr. ROBACK. And they would be free, by the logic of that statement, for anything else?

Secretary CHARYK. Yes.

STATUS OF NEW CORPORATION

Mr. ROBACK. Now, General Schriever, what is the status—perhaps Mr. Charyk should answer this—what is the status of the new corporation? What did you do to set about establishing it?

Secretary CHARYK. Well, I can perhaps begin a reply to that. As I indicated this morning, there are many details to be worked out in regard to acquisition of facilities, and so on. We have had people on the west coast who have been working with the STL and TRW people—in regard to the details of the transition, particular functions that would move, the laboratories that would be involved in the transfer, and so on.

Mr. ROBACK. These are Air Force people?

Secretary CHARYK. These are Air Force people.

Mr. ROBACK. Are these the people who composed an organizing committee, or is that another group?

Secretary CHARYK. No, this is simply directed to working out the details of such a transition. Now, in addition, there has been put together an organizing committee who has given thought to the corporate details of the problem, the thoughts as to the type of people that we would like to have in the new organization, and, in general, the broad character of the new organization.

ORGANIZING COMMITTEE

Mr. ROBACK. Who are the organizing committee, and who appointed them?

Secretary CHARYK. The organizing committee was originally brought together as an informal group by General Schriever. Subsequently the Secretary asked them to consider themselves as a formal group for the purpose of making recommendations to him as to the new corporation.

Mr. ROBACK. Can you say who they are? Is there a given number?

Secretary CHARYK. Yes, we can certainly provide the names of the organizing committee for the record. General Schriever can name them or I think I can. They are Mr. William Foster, Dr. Jerry Wiesner, Mr. Ted Walkowicz, Dr. Baker, General McCormack. I think that is the complete group. Mr. Ted Walkowicz later withdrew for personal reasons.

BOARD OF TRUSTEES

Mr. ROBACK. Are these men of the caliber who might likely be members of the board of trustees?

Secretary CHARYK. They are men of the caliber that we think are needed for the board of trustees.

Mr. ROBACK. Is it the case that the board of trustees as a policy group would be crucial to the success or failure of the new organization?

Secretary CHARYK. I think that the board of trustees is important. I think the real key, of course, is in the character of the top people who will actually run the organization. I think the board is important in insuring that we can attract the kind of people that are necessary to discharge these functions in key executive spots.

Mr. ROBACK. What criterion are you using for the selection of the board?

Secretary CHARYK. Well, I think that, most important, they must be able to attract for the key positions in the new corporation the types of people that we want. I would view this to be the most important item. They must also be people with good business judgment and experience, so that they can provide the necessary overall direction to the corporation, that they can make sure that the corporation continues to operate in a fashion to properly discharge its responsibilities to the Air Force.

Mr. ROBACK. You will want men who have national reputation, I assume?

Secretary CHARYK. Certainly.

Mr. ROBACK. You will want men who are dedicated to the public interest, I assume?

Secretary CHARYK. Certainly.

Mr. ROBACK. You will want men who have some guts and have some understanding of the problem, I assume?

Secretary CHARYK. Very important.

Mr. ROBACK. Now, has any pressure been put upon you, General Schriever, or you, Mr. Charyk, or anybody here, as to the type of people that ought to be on the board of directors?

Secretary CHARYK. No——

Mr. ROBACK. Excuse me—I mean as to who ought to constitute the board of directors, not the type of people, I mean who actually is to serve. Have you been given to understand that anybody was either to be recommended or not recommended?

Secretary CHARYK. No, I would certainly not say that there has been any pressure. We, of course, have had discussions with a good many people as to potential candidates for the board of trustees, as to the distribution of backgrounds that should be represented on the board, and in summary, on the general qualifications of the board of trustees. And as in any of these matters, various people have different ideas and various suggestions as to the type of people that they would like to see represented.

Mr. ROBACK. Who finally is responsible for selecting the board?

Secretary CHARYK. Well, the Secretary of the Air Force, in the last analysis, would express his satisfaction with a slate that was presented for his consideration.

(The board of trustees of the Aerospace Corporation was subsequently announced as follows:)

Chairman, Roswell L. Gilpatric, Under Secretary of the Air Force, 1950–53, now member of the firm of Gravath, Swaine & Moore, New York, N.Y.

Chairman of the executive committee, Dr. Charles Lauritsen, physicist, California Institute of Technology.

Trustees:

Dr. Gifford C. Furnas, chancellor of the University of Buffalo.

Trevor Gardner, Assistant Secretary of the Air Force, 1955–56, now president, Hycon Manufacturing Co.

Edwin E. Huddleson, Jr., attorney, San Francisco.

Roger Lewis, vice president, Pan American World Airways.

Arthur E. Raymond, former vice president, Douglas Aircraft Co.

Dr. Chalmers W. Sherwin, professor of physics, University of Illinois.

Dr. Jerome B. Wiesner, direct of the electronics research laboratory, Massachusetts Institute of Technology.

Maj. Gen. James McCormack, USAF (retired), vice president, Massachusetts Institute of Technology.

Gen. Earl Partridge, USAF (retired).

COMPETITION FOR PERSONNEL

Mr. ROBACK. Now, you will be, will you not, a competitor with STL for STL's employees?

Secretary CHARYK. I think that people who are presently associated with STL will have to determine whether they will go with the new corporation or stay with STL.

Mr. ROBACK. Is there any resistance on the part of STL, or have they cooperated in inviting their key people, or any of their people, to move over to the new corporation?

Secretary CHARYK. Actually, I have not heard, personally, of any attempts to do other than to cooperate with us in working out this problem.

Mr. ROBACK. Can we get some closer testimony, closer to the area of operation? Colonel Bishop, have you any observations?

Colonel BISHOP. Well, yes. The plan that has evolved here, as has been brought out, is one that simply emerged as a result of looking at all of the possibilities, and it emerged as a plan that was acceptable to all parties.

The working out of the transfer of functions and the identification of people in STL with those functions was a cooperative effort with STL. We did this together.

Mr. ROBACK. You are not fighting; you are not competing in the sense of resisting each other?

Colonel BISHOP. No; there is no competition for the initial phase of the transition, because it will simply be a question of what the individual people want to do.

Mr. ROBACK. And the Air Force, you, as the Ballistic Missile Division managers, would not want to hurt your own programs by taking people in a way that would disrupt these programs, would you?

Colonel BISHOP. Not at all. We have just as much interest in one as the other, as far as the mission is concerned.

ORGANIZING COMMITTEE SELECTS TRUSTEES

Mr. HARDY. Could I explore this matter of selection of the board? That is what you are still taking about, the trustees, isn't it?

Mr. ROBACK. We are talking about staffing, but that is all right.

Mr. HARDY. You have just been on that, I thought you were probably still on it.

As I understood it, Mr. Secretary, you indicated that the Secretary of the Air Force would select the members of the board of trustees?

Secretary CHARYK. No. I said that he would review the potential trustees that would be recommended and offer his comments thereon.

Mr. HARDY. Who would make the selection?

Secretary CHARYK. I think in the final analysis if he acquiesced on the slate that was presented to him, that that would pretty much constitute the board of trustees.

Mr. HOLIFIELD. Mr. Hardy's question was, who would originate the selection of the board to send up to the Secretary?

Secretary CHARYK. The organizing committee was specifically requested by the Secretary of the Air Force to submit to him a list of possible members of the board of trustees.

Mr. HARDY. Would the corporate charter empower the Secretary of the Air Force to appoint these trustees? That is what I am getting at.

Secretary CHARYK. No.

CALIFORNIA CORPORATION

Mr. HARDY. Who would it belong to, who would the corporation belong to, who would have the right to appoint them, who would determine their length of service, who would fix their compensation, if any; how would you get rid of one of them if you had reason to? Those are the things I think we would like to know.

Secretary CHARYK. I might ask Mr. Golden to answer that.

Mr. GOLDEN. Sure.

Mr. HOLIFIELD. Mr. Golden.

Mr. GOLDEN. Nonprofit corporations have to be born. If they weren't affected with this great public interest, the Air Force would not be in the picture at all.

Mr. HARDY. They have got to have a charter?

Mr. GOLDEN. Yes. A group of men would get together and calling themselves under California law, either members or trustees or directors, would incorporate. In California it takes three. Simultaneously, as they incorporate, they would probably have ready a set of bylaws. Under the bylaws or under the articles of incorporation they could establish the number of the trustees, how they are appointed, their tenure, and how they are dismissed.

CORPORATE CHARTER

Mr. HARDY. Have you drawn the charter yet? You are going to draw the charter?

Mr. GOLDEN. No; but we are going to see the charter.

Mr. HARDY. Who is drawing it?

Mr. GOLDEN. It is being drawn now by, in effect, the organizing committee.

Mr. HARDY. Who is the organizing committee? These people you named a while ago?

Secretary CHARYK. The people that I named.

Mr. HOLIFIELD. Yes. It is a special committee appointed by the Secretary to——

Secretary CHARYK. To make recommendations.

Mr. HARDY. All right. The Secretary then set the committee up.

Mr. HOLIFIELD. That is right.

Mr. HARDY. And the committee has been authorized to draw up the charter. So actually the committee derived its authority from the Secretary, and the Secretary empowered them to draw up a charter to be submitted, to be approved by one of the States, California, I take it?

Mr. HOLIFIELD. Well, let's take it in order. First, I assume that a charter of the corporation and its objectives would be turned over by the organizing committee to the Secretary of the Air Force?

Mr. GOLDEN. Yes.

Mr. HOLIFIELD. For approval?

Mr. GOLDEN. Yes.

Mr. HOLIFIELD. It would have been drawn up in the first place in conformity with the laws of California, but certainly the act of incorporation would not go forward unless the Secretary approved it.

Mr. GOLDEN. Exactly.

Mr. HOLIFIELD. The charter.

Secretary CHARYK. That is exactly right.

Mr. HOLIFIELD. And its organizational setup and its mission.

Mr. HARDY. So the Secretary, initially, controls the terms of the charter? But does the charter then spell out the manner in which the Secretary—or will the charter spell out the manner in which the Secretary will control the makeup of the board of trustees?

Mr. GOLDEN. It probably will not. I think you have here the situation where a nonprofit corporation is still a private corporation under California law. It is not a profit corporation, but it is a private corporation. And nonprofit corporations are born for charitable, educational, scientific, and other interests.

They are created for a variety of reasons. In this case it is affected with the Air Force interest and is generated by Air Force interest, but it will, nonetheless, be a nonprofit private corporation.

Mr. HOLIFIELD. And it is completely dependent upon the Air Force for its salaries.

Mr. GOLDEN. Its bread and butter will come from the Air Force.

Mr. HOLIFIELD. If it ever came to a point where the Air Force wanted to stop the further action of the corporation, why, I assume there would be in the charter of the organization permission, or at least a clause which would make it dependent upon continued Air Force support?

Mr. HARDY. That would be a contract provision, I would presume.

Mr. HOLIFIELD. I presume so.

Mr. HARDY. But as I see it, if it is a matter of incorporating under the laws of an individual State, it is not to be a Federal corporation, there being no Federal control over it at all, and having set the thing up, the Secretary of the Air Force is actually the motivating force behind it, but having set it up, it then becomes a child without a father, or it has a new one, some foster fathers.

Mr. HOLIFIELD. Well, the contract, the liaison between the child and the father in this instance would undoubtedly be the contract between the corporation and the Air Force, just the same as any other contract.

Mr. HARDY. It is not hard to recognize the kind of corporation that is going to be.

Mr. GOLDEN. It is going to be a good California corporation. [Laughter.]

Mr. ROBACK. Has the corporation been legally formed?

Mr. GOLDEN. No.

Mr. ROBACK. The articles have not been filed?

Mr. GOLDEN. No.

Mr. ROBACK. When is the intention to do that?

Mr. GOLDEN. The intention is to get the articles, get the bylaws, make sure we have the proper slate of trustees on the board——

Mr. HARDY. To start with.

Mr. GOLDEN. And, if we can have it at about that time, the operating head. Then we will know the show is on the road. All that will be submitted to the Secretary and we can get started.

Now, it may be you might not wait for the last event; namely, the operating head.

Mr. ROBACK. Will you give us a date, a tentative, approximate date when all this will be done? Is it not the case that all these delays over a period of time have an impact on your administration of the missile programs?

Mr. GOLDEN. I don't think it has an impact on administration of the programs.

Mr. ROBACK. You look at it from the standpoint of a lawyer in the Pentagon. I am thinking of it from the standpoint of the men who build the weapons out in the field.

Mr. GOLDEN. Then I will let them answer the question.

Mr. ROBACK. Colonel Bishop, what do you have to say about it?

General SCHRIEVER. Maybe you ought to let me. [Laughter.]

I think it is very important that we get on with it. I think time is important. One could always say one could do more, but we are work-

ing on it, I can assure you. It is not an easy job, and I have been constantly working with Dr. Charyk and Mr. Golden. I think we see our way clear on this, but I couldn't give you an exact timing. I hope it is soon. I think it is important that we do make the decision soon.

OPERATING CAPITAL PROBLEMS

Mr. ROBACK. Where is the operating capital going to come from?

General SCHRIEVER. Why don't you give the plan on that, Sam, because you have a little more on it?

Colonel BISHOP. Yes. If I may, before I give you a specific answer, I would like to explain the answer I am going to give you.

Mr. ROBACK. That is always helpful. [Laughter.]

Colonel BISHOP. A great deal of thought was given to this question of operating capital for the new corporation, nonprofit as it is. There is not a very active market in putting up operating capital for a nonprofit corporation. [Laughter.]

Colonel BISHOP. So we considered several possibilities. There are, of course, organizations in the country which take a very active interest in the public good and are willing to sponsor projects of national interest, and this was regarded to be such by all who might have been willing to put up the capital. But in the final analysis, it was decided that a corporation of this kind should try to get off without any entanglement with a financing group which might possibly react detrimentally on the program in the future.

Therefore, based on some very good advice from people who had done this kind of thing before—that is, put together nonprofit corporations for specific national purposes—we elected to try the advanced payment pool plan. We researched the plan and we find that it is perfectly sound, it can be done, although it is a matter of careful timing. This is, then, the answer to your question: We propose to authorize advance payments in the initial phase.

Mr. ROBACK. That is, on contract?

Mr. HARDY. That is what you get for having good lawyers, they can always find a way to do what you want done. [Laughter.]

Colonel BISHOP. We have some good lawyers.

FOUNDATION SUPPORT OF NONPROFIT CORPORATION

Mr. ROBACK. When you referred to a financing group, it would be one like the Ford Foundation?

Colonel BISHOP. Yes.

Mr. ROBACK. The Ford Foundation has provided the operating capital for the Institute for Defense Analyses, and also for Rand, I believe, at one time.

Colonel BISHOP. I believe you are correct on that.

Mr. ROBACK. You felt that even that type of a sponsorship might prejudice in some manner the objectivity?

Colonel BISHOP. Well, we didn't really think that it would, ourselves. We felt the Ford Foundation was a very fine organization for the purpose.

Mr. ROBACK. Was it due to the fact that maybe they turned down your request?

Colonel BISHOP. No; we did not submit a formal request, nor did we have a formal rejection.

General SCHRIEVER. I can give you the reason——

Mr. HOLIFIELD. As this is a complete Government function, why shouldn't the Government put up the money? It is an operating fund. I applaud you, rather, for not going out and getting any kind of entangling moneys. That was the thing that we got into before with STL; they had to go out and finance it, and they financed it through loans from Thompson Products Co. and others, and this brought about a great deal of criticism later.

Mr. ROBACK. The record does not reflect that they did not try to get Foundation money. I think General Schriever ought to explain that.

Mr. GOLDEN. I would like to add also that this doesn't saddle the new corporation with an interest burden that they would have to carry.

Mr. ROBACK. I was only asking whether the testimony was making a virtue of the fact that you were rejected. I assumed you had explored the possibility of the Ford Foundation, among others. Had you?

General SCHRIEVER. Let me answer that. We explored it in the sense that we discussed it internally. We did not go out and ask anyone. I had a long conference with Mr. Rowan Gaither, who was chairman of the board of Rand Corp., chairman of the board of MITRE, and who has had long experience in this sort of thing. The main reason that we decided, in addition to what Colonel Bishop said, that we wanted to avoid any entanglements whatsoever, was that Mr. Gaither, who was also chairman, incidentally, of the Ford Foundation, indicated that under any circumstances there would be a delay of anywhere from 90 days to 6 months in getting such a loan, because it would have to go through the various details of that particular organization.

So we decided on a time basis it was not desirable either. Mr. Gaither felt that this advance payment approach was a very sound one, incidentally.

ASSETS OF NEW CORPORATION

Mr. ROBACK. Will the corporation charter provide that if the corporation is dissolved, the assets will go to the Government?

Colonel BISHOP. May I answer that?

General SCHRIEVER. Yes.

Colonel BISHOP. The articles of incorporation have not been completely finalized as yet.

This possibility of disposition of assets upon dissolution has been considered. But the only thing we are really seeking so far as that eventuality is concerned, is that the corporation qualify for what we are trying to make it, a nonprofit corporation committee to work in the Government interest. Therefore, it should be tax exempt as such corporations are.

Mr. HARDY. If it is a nonprofit corporation, it won't accumulate assets?

Colonel BISHOP. Yes, sir; it will accumulate assets.

Mr. ROBACK. It will get some, it will get a fee?

Colonel BISHOP. Yes, sir. In our contracts with nonprofit organizations, we try to pay a modest fee in recognition of the work that they are performing.

USE OF CORPORATE PROFITS

Mr. ROBACK. Will the charter provide, and this was perhaps one of the benefits of the Ford Foundation sponsorship for IDA, that as an obligation in return, the corporation has to expend its profits on public service enterprises? Now, will this corporation have to do that?

Colonel BISHOP. Yes, sir. Not exactly public enterprises, but it will be restricted to using its profits for furtherance of its mission.

Now, this means that it can expand its facilities, if the Government has a requirement for them, it can pay interest on borrowed capital if it must, because we will not under our rules reimburse interest on borrowed capital; and it can carry on institutional advertising for the purpose of presenting the corporation to industry.

There are a number of things of that kind that we do not reimburse. Therefore, the company will have to realize some retained earnings in order to finance those kinds of activities.

Mr. HARDY. Institutional advertising—would that kind of a company be involved in that?

Colonel BISHOP. Institutional advertising in the case of a nonprofit organization is a proper thing in order to, as I say, keep its mission before those organizations who must work with it.

Mr. HARDY. Keep its mission before the Congress in order for Congress to appropriate more money so that they will get more contracts with the Air Force.

Colonel BISHOP. No, sir.

Mr. HARDY. We don't want to go through this mess that we had on the Bomarc and the Nike.

Colonel BISHOP. This type of advertising is nonreimbursable as costs.

Mr. HARDY. So they contended that was. Nevertheless they—I hadn't intended to make this observation, but Mr. Golden when he spoke of the fact that by this method of finances it avoided a necessity for the new corporation to pay any interest. It simply transferred that to the taxpayers. [Laughter.]

Mr. GOLDEN. No, remember the purpose of this corporation——

Mr. HARDY. I understand, I don't want to criticize that at all. I understand the purposes and I sort of feel as the chairman does, that this is the kind of a thing that ought not to be entangled with private finances.

Mr. GOLDEN. That is the theory.

Mr. HOLIFIELD. Stock fund financing, like the Navy has, like the MATS operation, is furnished to them for their operation without interest.

Mr. HARDY. That is right, but ordinarily you don't have too many of these advance payments which don't have some compensation from an interest standpoint.

Mr. GOLDEN. With profitmaking corporations we do, but with nonprofit and educational institutions we don't.

Mr. HARDY. You ordinarily don't have any under this kind of arrangement, which is all right, but you opened the door.

Mr. GOLDEN. I try not to with you, but occasionally I slip. [Laughter.]

Mr. HOLIFIELD. Mr. Roback?

GROWTH OF STL

Mr. ROBACK. General Schriever, at the time that intensive study was directed to the future organization of STL, what types of problems confronted the Ballistic Missile Division? What did it find after 5 years of experience? Did it find, for example, as the Millikan committee found, that the STL had grown too large?

General SCHRIEVER. Well, this was one opinion of the Millikan committee that I don't agree with.

Mr. HOLIFIELD. Our invited member is leaving. I would like to say that we have enjoyed his assistance and we invite you back again, Mr. Hardy.

Mr. HARDY. Thank you, Mr. Chairman. Let me express my appreciation also to the very able witnesses we have had here today. I was particularly happy that they have got such fine legal counsel, because he keeps them out of trouble. [Laughter.]

Mr. HOLIFIELD. Off the record.

(Discussion off the record.)

Mr. ROBACK. You say you did not agree with the Millikan committee finding that STL has grown too large?

General SCHRIEVER. No, I did not agree with this. I think that they did not take into account the tremendous additional workload that had been imposed on the Ballistic Missile Division, and in turn on STL.

But my major concern was that there was the natural motivation of a profit organization to grow and grow, not necessarily in connection or in relationship to the job it had to do specifically for the Air Force. In connection with this growth there was, I felt, a tendency to diversify some of the talents into other areas which were to some extent diluting the major effort—the ballistic missile programs.

USE OF TECHNICAL TALENTS FOR OTHER JOBS

Mr. ROBACK. Did that also involve a graduation of technical talent to administrative or management positions?

General SCHRIEVER. Well, this came about through a series of problems. The top management personnel had to become involved in matters that were not related specifically to the programs—that is, to the substance of the program—just as I became involved in many things which were not specifically associated to the management of the programs.

As I mentioned earlier, the answer to criticisms and things of that kind took up an awful lot of time.

Another matter, which I think had to do with the permanency or stability or the organization, concerned this situation of criticism and harassment. You might say that this was associated with our particular activity out there, and that we just couldn't continue to live with it for an indefinite period, not at the level at which it was being applied.

NEGOTIATION PROBLEMS

Mr. ROBACK. Some of the problems were imposed upon you by criticism from the outside, but were problems imposed upon you by difficulties of negotiation? After 5 years did you find it easier or more difficult to negotiate with STL about work, costs, future projects?

After all, they had incentives you said that were somewhat different from the Air Force's requirements?

General SCHRIEVER. Well I think it is fair to say that it became somewhat more difficult. Although we were completely justified in carrying on our program under the management that we had arranged, there were certain deficiencies over the long pull—particularly in the matter of advance planning, the evaluation of contract or technical proposals and so for—which simply appeared to us would continue to create an instability, due to continued criticisms and problems that we would have with industry.

So it was a combination of these things that led me to believe that we had to make some change, some reorientation, if we were to maintain this management approach to these very important programs.

INDUSTRY ATTITUDES

Mr. HOLIFIELD. Could I ask at this time: What is the attitude of industry or has it been expressed, towards this new solution?

General SCHRIEVER. I have not heard it expressed.

Mr. HOLIFIELD. Is it your opinion that this would relieve you of some of the criticism from industry that you have had in the past?

General SCHRIEVER. I think it would to a rather high degree. No matter what you do, however, you are always going to be criticized.

Mr. HOLIFIELD. Yes.

General SCHRIEVER. And you learn to live with it.

Mr. HOLIFIELD. But in dealing with this new corporation, they would be, in effect, dealing directly with the Government?

General SCHRIEVER. That is true.

Mr. HOLIFIELD. Although there would be the corporate setup, but they would be dealing——

General SCHRIEVER. I think you eliminate one very definite concern and criticism, whether justified or not, and that is that this new corporation would definitely not be considered as a potential competitor.

Mr. HOLIFIELD. I see.

Mr. ROBACK. Of course, these hearings are for the first time, perhaps, providing information to industry? The industry really doesn't know about this program, do they?

General SCHRIEVER. They do not know about it officially; no. The news seems to travel, though, and I am sure they know all about it, although they don't officially as far as the Air Force is concerned.

LESSONS OF MISSILE PROGRAM

Mr. ROBACK. General Schriever, you were—as you described it—the architect of the ballistic missile management setup of the Air Force, which had a rather special relationship with STL, and also as

between the Research and Development Command and the Materiel Command of the Air Force.

Now, in your new responsibility as commander of ARDC, what have you learned from the missile management experience and how are you exercising or putting those lessons to work?

General SCHRIEVER. Well, of course, I feel that we learned in our management approach on the west coast the very important aspects of doing a job in an integrated manner. By that I mean having planning, programing, and budgeting in an integrated manner, including not only the devlopment and testing, but also the production, the operational, and the logistics aspects, and having them under centralized management control for the implementation of the program.

I think this is a concept of management which we had not before then employed in the Air Force.

Now a study directed by the Chief of Staff's Office has been underway to find ways and means of improving the effectiveness of our weapons system management within the Air Force. This study has been going on for some time, and I think that certain aspects of the management concept out there will be adopted in other places with respect to total weapons system management within the Air Force.

NEW ORGANIZATION PLANS

Mr. ROBACK. At this time is it premature to ask for an outline of that organization?

General SCHRIEVER. There have been no decisions made on this yet. There has been a very exhaustive study by the Air Force, but it is very definitely premature for me to say anything concerning the outcome of this. It has not yet been considered by the Chief of Staff, for example, nor at the secretarial level, so there is nothing that I could say about it at this time that is specific in nature.

Mr. ROBACK. Are you reorganizing your own command or have you reorganized it?

General SCHRIEVER. Yes; and, of course, there have been changes made during the past year which I think have led to an improvement in the efficiency and effectiveness of our management. It takes time to really see the results of these things, but there have been changes made.

In ARDC I have reorganized into four major divisions. The Ballistic Missile Division was in existence. I combined the activities at Wright Field and established the Wright Air Development Division. In Boston the Command and Control Development Division, and here in Washington the Research Division were established. The three development divisions have the responsibility for development, and procurement is by AMC for the ballistic missile programs. The Ballistic Missile Division and Ballistic Missiles Center of AMC are on the west coast. The Aeronautical Systems Center of AMC is in Dayton, as a counterpart of the Wright Air Division, and the Electronics System Center of AMC is in Boston at Hanscom Air Force Base with the Command and Control Development Division.

Actually these moves have been in the direction of the management concept that was started on the west coast. I think it brings together in a more centralized fashion the management and control of our weapons system programs in the Air Force.

Mr. ROBACK. Does each of these basic divisions that you have set up have a portion of the Air Materiel Command function within it?

General SCHRIEVER. No; the air materiel function is performed by the Air Materiel Command, but they have a center working right in the same geographical location and working with each development division on a day-to-day basis in these other locations, just as does the Ballistic Missile Center on the west coast.

The procedures and the policies are slightly different, but the organizational arrangement is very much the same.

AIR FORCE SPACE RESPONSIBILITIES

Mr. ROBACK. Considering the fact, if it is a fact, that most all weapons systems now are really development systems—the technology is moving so fast that every system is a development system—is ARDC the basic framework for Air Force weapons and space work of the future?

General SCHRIEVER. Yes; I think it is fair to say that ARDC is the basic or fundamental organization for their development, and it has the responsibility for the development of all Air Force systems.

Mr. ROBACK. Some of these responsibilities have been recently assigned, have they?

General SCHRIEVER. No; we have always had this responsibility.

Mr. ROBACK. But some have been recently assigned to the Air Force, at least in the space field.

General SCHRIEVER. Oh, in the space area? Yes. We now have the Discoverer, the SAMOS and MIDAS programs as Air Force responsibilities, although they were originally initiated by the Air Force.

In addition, under the McElroy directive, the Air Force is responsible for providing the booster for any other space systems for which another service might have the payload responsibility.

The booster responsibility also includes the systems integration which is incident to the booster job. In other words, you may have 3 or 4 stages in the booster in order to get the payload into orbit.

The Transit program is one example of this; the Navy has the responsibility for the payload, the Air Force provides the booster and all the resources that go with it. The only space system which is now, at the present time, not assigned to a service is the communications satellite, which is still under the directive of ARPA. But I think the intention here is that it will be assigned to one of the services, too.

Mr. ROBACK. Have your earlier concerns about ARPA been pretty well dissipated?

General SCHRIEVER. Yes. [Laughter.]

NASA-AIR FORCE RELATIONSHIPS

Mr. ROBACK. Have you any observations to make with respect to the relationships of the defense and civil space responsibilities?

General SCHRIEVER. Well, I think that we, of course, have been going through a learning curve during the past year or two. I would say that at the present time our relationships with NASA are extremely good, and that we have coordination activities and working

relationship from the top level right on down to the lower working levels.

I can give you several examples, if you would like. We have Air Force officers who have been assigned to NASA. For example, the project office being run for NASA out on the west coast has Air Force officers who are assigned to NASA right in the AFBMD location.

I feel that the bill that has been reported out of the House Space Committee would perhaps tend to clarify, at least from an interpretation standpoint, some of the problems that were raised in the old bill. However, this does not mean that we are not working together, and working together well under the present bill. I think the current bill would be an improvement, the proposed bill.

MILITARY NEED FOR BIG BOOSTERS

Mr. ROBACK. Do you subscribe to the evaluation of the big space booster that has been given by Dr. York and by others that there is no military requirement for it?

General SCHRIEVER. Well, this is a matter of definition of what is a military requirement. We do not have a written military requirement for such a booster at the present time. I am sure, however, that Dr. York and I are in complete agreement that we will need a booster of this size at some point for military space applications. I am sure that he agrees with that. But we do not have at the moment a hard and fast military requirement, as such.

As far as I am personally concerned, I think it is quite appropriate at the present time that NASA should be developing the Saturn, for example, and the Nova.

ROLE OF NEW CORPORATION

Mr. ROBACK. Do you have any observation with regard to the new corporation and the more circumscribed role that it has with relation to contractors? It will not penetrate, so to speak, the manufacturer's plant so directly and deeply as did STL. Will it therefore lose touch and become more of an academic kind of advisory group?

General SCHRIEVER. It certainly isn't my intention that it become an academic kind of an advisory group. I think it will need to maintain close touch with contractors in carrying out its technical monitorship role, which is still a very important role from the standpoint of our techical supervision and direction of the contractors. Where the new corporation differs with respect to STL is that STL has a line responsibility, whereas the new corporation in the normal role will have a staff responsibility.

Mr. HOLIFIELD. It would, in effect, report to you——

General SCHRIEVER. Yes, sir.

Mr. HOLIFIELD (continuing). Any observations, and then you would act separately from them?

General SCHRIEVER. Well, yes, the Air Force would be directing the contractor, but we would apply just as close technical direction through a staff arrangement, if we felt it was necessary.

As you recall, one of the things in the Millikan Committee report which I subscribe to is that there has been an increase in the competence of the industry, in the management and technical direction of these programs. But it still is necessary for the Government to have available to it the kind of technical staff that can evaluate what is going on and be sure that we know what is going on, so that we can get the objective kind of answers that are needed to make decisions as these programs move along.

As Dr. Charyk pointed out, we are not necessarily going back to a single prime and a group of subcontractors. We may very well go to a systems integrator having systems responsibility and associate contractors, which means, again, that we have to have a relatively high degree of technical capability for supervision.

We are instituting this type of policy and operation in our Wright Air Development Division at the present time in some of our new systems like Dynasoar. So we are going to have a higher degree of technical supervision from that organization than we have had in the past. That is our plan.

AIR FORCE INHOUSE CAPABILITY

Mr. HOLIFIELD. Let me ask you if this type of arrangement is going to result in building any real in-house capability in the career service people?

General SCHRIEVER. Let me say that I certainly cannot say that having this, a nonprofit organization, in itself, will help build an in-house capability.

Mr. HOLIFIELD. That is what I am seeking to know. Will this be separate and apart from the uniformed service people to the point where you will, in effect, be developing a capability outside of the service, or will the contacts of your service people, the necessary contacts between them, be so close that there will be an educational program in effect take place upon your own people to bring your own people to a higher level of scientific and technical competence?

General SCHRIEVER. There is no question that the contacts will be extremely close, and this will bring about the osmosis that you are talking about.

For all practical purposes, this is an in-house capability, as we look at it.

Mr. HOLIFIELD. I understand that, but I was really referring to the inherent capability such as exists in a man like Admiral Raborn, or a man like Admiral Rickover. These are men that have developed a high degree of technical competence within their own right, and their staffs, incidentally, too.

General SCHRIEVER. Well, just to give you an example: Our military people are highly competent people, also. We may not have enough of them, but we have some 450 military officers at AFBMD who are performing the technical management, aside from the administrative jobs. Roughly 50 percent of those officers have advanced degrees. A little over 90 percent have degrees, and most of them have been engaged in development activities for quite some period of time. So they are highly competent officers. But they are involved to a very large extent in the executive management role. For

the detailed evaluation, the technical evaluations that are necessary if you are going to supervise your programs properly, you require people who actually work with slipsticks, look at drawings, and make detailed technical analyses through computer runs, and so forth. We just don't have enough people in the blue suit, to perform these types of tasks.

We have about 10,000 of what you would call engineering personnel on our ARDC civil service staffs, and they will be performing technical management functions completely at Wright Air Division, and to a degree, in the Boston area.

But, then, when you look at our other jobs that we have in ARDC—our centers, you will note, are mostly in the testing and evaluation job—you will see that we have a very large number of our people engaged in this sort of technical activity, which is a very necessary activity.

INCENTIVES FOR TECHNICAL COMPETENCE

Mr. HOLIFIELD. Is any real incentive given to your career people to qualify in technical fields through additional study and development? Does it affect their career, their promotions, and so forth?

General SCHRIEVER. Yes, it does. There are many things that can be done, I think, which would give people higher incentives. I have, in fact, gotten underway a detailed study on all personnel problems as they relate to this important job of weapons systems, research and development and management, both as it relates to military personnel and civil service personnel, and I intend to try to identify, specifically, the major problem areas and courses of action that would improve particularly the incentives and motivations of people in the service—both the military and civil service personnel.

I think much can be done outside of the area of simply saying, well, you give them more pay or fringe benefits. There are other incentives possible. I can't give you a laundry list of them now, but I personally intend to devote a great deal of my energy during the next year to this particular problem.

Mr. HOLIFIELD. This occurred to me because I know of some of the requirements, for instance, that Admiral Rickover puts on commanding officers of the nuclear submarine—and he passes, as I understand, on all of them. If a prospective commanding officer of a nuclear submarine comes to Admiral Rickover, he more or less examines him as to his professional qualifications. And if he finds him short in any field, he sends him back to school, you might say. The man goes back and obtains that special competence before he takes command of the submarine.

Now, the Air Force is going to face a big problem in surplus of pilots and navigators of manned aircraft. These people, because they have this proficiency, get flight pay as an additional incentive to their regular pay. Now, what I am suggesting that you think over, and I certainly haven't thought this out, is that some incentives might be advanced to career people which would cause them to seek to become more proficient, in this new scientific age that we are moving into, in the management, evaluation, and planning of programs.

General SCHRIEVER. You are 100 percent right, and I am very much concerned in the area of retaining the highly qualified people whom

we have. And you can retain them if you keep them motivated and give them the right incentives, and then get new people of high quality coming in to support them.

It is a big job. I am losing people now. I have had a number of officers resign in the past several months, most of them with advanced degrees, with 15, 16, 17 years' service. They are resigning—not even waiting to get 20 years' service in, when they could retire under the present laws. This concerns me a great deal. I know what some of the problems are. I can't give you the answers right now as to how to solve them. But the things that you bring out are certainly a very important factor.

Mr. HOLIFIELD. These matters are going to be of more concern to the Congress. Because when you get to the point where you have 75,000 people qualified for flight pay, and the number of your aircraft goes down, or if the scientific change occurs that looks to be coming, Congress is going to have to start looking at this flight pay problem. When it does, it is going to be very hard to justify flight pay when they are not flying. I am interested in the continuing development of your in-house capability. And I just wondered if this was worthy of consideration, if any thought or planning, had been worked out as to a definite incentive ot raise the proficiency of the people in uniform.

Mr. ROBACK. Didn't the Millikan committee comment on this question of in-house competence?

General SCHRIEVER. Yes, I have forgotten the exact language, but they did recommend efforts to build up, to improve in-house competence.

Mr. ROBACK. Were they thinking of having the corporation do it, or were they thinking of actual Air Force personnel?

General SCHRIEVER. I think they were referring primarily to Air Force personnel, both military and civil service.

Mr. ROBACK. Do you construe the drift or the bent of their recommendations to be that when such competence would be built up, and as the contractors in the missile and space fields acquired competence also, that the need for an intermediary corporation to give them technical advice and other services would be dispensed with? Is that the thrust of their recommendation?

AIR FORCE DEPENDENCE ON CONTRACT CORPORATIONS

General SCHRIEVER. Well, I don't believe that they really attempted to project themselves that far in the future. When I look at my problems—and I look 3, 4, 5 years in the future—I cannot see how we can do the job properly in the Air Force without the assistance of, say, corporation A and the MITRE Corp. I am putting a lot of military and civil service personnel in the Boston area, but here, again, is a highly complex development area, this command and control business. Just the integration of these systems—these large computers and data-handling systems, communications networks, and so forth—requires a very high quality of personnel in a technical sense. I don't see the end of this at all myself.

Mr. ROBACK. Is MITRE under your ARDC cognizance?

General SCHRIEVER. Yes.

Mr. ROBACK. Are there any other corporations under ARDC, that is, which provide technical services besides these we are talking about?

General SCHRIEVER. No; Rand is not technically under ARDC, it is under Headquarters, Air Force. The Lincoln Laboratory at MIT is also not administratively under ARDC, although we are the subordinate command within the Defense Department which has the most to do with Lincoln Laboratories. However, MITRE and corporation A are different types of organizations than Lincoln Laboratory, which is a laboratory. Rand is really a study and analysis type of organization.

Mr. ROBACK. Do you contemplate setting up any other corporations under ARDC, or sponsoring them?

General SCHRIEVER. No, sir; I think not. As far as the organizational structure goes, in looking at it in relation to the job we have to do, I consider what is in process now is adequate, at least for the foreseeable future.

Mr. ROBACK. Mr. Charyk, one or two points on your statement.

You referred in several places to the closed-loop guidance flight. Will you explain that for the benefit of the nontechnical reader, including me?

Mr. HOLIFIELD. Before you start on the explanation, may I get back just one moment, General, to my suggestion as to the increase in professional competence of members of the Air Force?

It was not necessarily directed to a narrow field of specialization, because I agree with you that technology is moving so fast that this proficiency could not be obtained, this, let us say, specialized type of proficiency as a physicist, or another type of specialist, but the increased proficiency might well be in a type of management of these highly scientific fields and coordination of them, which would not require necessarily a complete proficiency in one specialization, but would require an overall concept of the problem so that the uniformed people could, in effect, do the job of evaluation and management a little better. And this is said without any reflection, of course, upon what they are doing now.

General SCHRIEVER. Yes; this is a hard thing to train a man for.

Mr. HOLIFIELD. I know.

General SCHRIEVER. The most difficult job that I have had in my career of trying to manage research and development is to find the manager type, the executive type. You can find technical people who are extremely competent, but they are so competent in their particular area that they cannot disassociate themselves from the details. It is very difficult to find the technical executive. And I am not saying that you cannot train a man toward this—you have to—but to some extent a man has to be born with this. You help him along to get there. But I hope to develop plans both for short-range improvements and long-range improvements, personnelwise.

Mr. HOLIFIELD. Now, Dr. Charyk. I didn't want to leave that hanging in the air.

Mr. ROBACK. Off the record, Mr. Chairman.

Mr. HOLIFIELD. Yes.

(Discussion off the record.)

Dr. CHARYK. Well, the reference to closed-loop guidance: In our earlier experimental flights we fly the guidance system and monitor

its performance, but the guidance system does not actually guide the vehicle. When we finally get to the point that the guidance system actually guides the vehicle, we call this a closed-loop flight.

Mr. ROBACK. What is the meaning on the bottom of page 4 of your statement that the Air Force has launched well in excess of 90 percent by weight of the space payloads? Is the weight significant here? What is the significance of the statement?

Dr. CHARYK. The statement is merely to give some indication of the Air Force capability in regard to space boosters. The total payloads that have been launched into orbit have, by and large, been launched using Air Force boosters. This was the point that I wanted to make there.

Mr. ROBACK. Well, it is hard to tell from that who else is launching payloads. The Army and NASA?

Dr. CHARYK. Yes. Outside of the Air Force there are a certain number of space payloads that were launched by the Army. I think these number about four in all.

Mr. ROBACK. But you are saying here that 90 percent of the payload work has been Air Force, the boosting of the payloads, 90 percent of that job is an Air Force job? Is that what this statement means?

Dr. CHARYK. That better than 90 percent of the payload weight that has been placed in orbit, has been placed in orbit by Air Force boosters.

Mr. ROBACK. How many payloads have been put in orbit, of which how many are Air Force?

Dr. CHARYK. Well, just trying to recall here, I would guess in the case of earth satellites, that Air Force boosters have been used in about 12 of the successful satellites.

The Army, I believe, has placed four earth satellites in orbit, and then there were the original Vanguards which were under a special arrangement. I guess there have been about three of those.

Mr. ROBACK. You just put in this 90-percent figure because it looks better; is that the idea?

Dr. CHARYK. No, I think it is quite significant, because as we get into the space business in a serious fashion it is going to become important to have the capability to put sizable payloads in orbit. The value of very limited payloads is going to decrease with time. So I think it is important that we have that capability.

GENERAL ACCOUNTING OFFICE REPORT ON MISSILE PROGRAMS

Mr. ROBACK. Just one more series of questions, about three minutes.

Mr. Charyk, in the fall of 1958 the Comptroller General stated in testimony before one of the subcommittees of this committee that he would conduct an investigation of the Air Force ballistic missile programs. Will you tell us what you know about that investigation?

Dr. CHARYK. It is true that the Comptroller General's office has conducted an intensive investigation of the ballistic missile program. It is my understanding that they intend to submit a report to the Congress in the near future. We have not seen the report that they propose to submit.

Mr. ROBACK. Did they submit a draft of a report?

Dr. CHARYK. We have seen drafts of reports.

Mr. ROBACK. More than one draft?

Dr. CHARYK. There were actually two drafts that I can recall.

Mr. ROBACK. Have you presented comments to the General Accounting Office on the draft or drafts?

Dr. CHARYK. The Secretary of the Air Force sent letters to the Comptroller General giving comments in regard to both of these drafts.

Mr. ROBACK. But you have not seen the final report, nor do you expect to receive any further report for commentary, is that correct?

Dr. CHARYK. My understanding is that they will submit the report to the Congress in the near future. I would presume that we might receive a revised draft at about the same time.

Mr. ROBACK. Well, the Chairman has been advised by the Comptroller General that a report will be submitted to the Congress during the week, I believe, of May 16.

Dr. CHARYK. I see. We have not seen a draft of the report that he proposes to submit.

MIX OF STRATEGIC WEAPONS

Mr. HOLIFIELD. Dr. Charyk, recently the subcommittee held hearings on civil defense matters, and we inquired into the relation of civil defense to missile programs. We were concerned, for example, as to whether missile base hardening would multiply the potential fallout hazards. And this led to a consideration of alternative methods for reducing vulnerability of our retaliatory weapons and vulnerability, of course, of the populations surrounding our bases. I know this is a subject within itself, and I am not going into it, but the Chair will direct the staff to prepare a letter to you on this, and on the role of the Minuteman as the strategic weapon of the future. We will ask you questions as to its invulnerability in relation to Soviet bases, to fixed bases—hard missile bases, rather—and to the Polaris system. There will be some questions along that line. There may be, after we go over the transcript, some other questions that we would like to send to you and we will keep the record open for the reply.

Would you like to comment on that subject at the present time or would you prefer to furnish us with an answer to the specific questions?

Dr. CHARYK. Well, I might simply comment that the mix of strategic weapons that we feel is necessary for the security of the country in the future is one of the most important problems that we face. Therefore it is a matter of intense study at all times to insure that as we plan our various programs we are moving toward the production of those weapon systems that will insure the kind of strategic capability that we feel that this country must have.

Into this must enter a great many considerations. Cost is certainly one of the most important ones. The weapon systems are becoming more complex and more costly and it is important that we select the systems well. Then, I think we must insure that our development programs are set up and directed in such a way that the systems that we have decided upon are brought to maturity at the earliest possible date and introduced into the operational inventory.

We would be very happy to attempt to answer the questions which you propose to submit.

MOBILE MISSILE SYSTEMS

Mr. ROBACK. Do you conceive the Minuteman will be a considerably cheaper weapon?

Dr. CHARYK. We feel that the Minuteman is going to be a very important element of our strategic forces in the years ahead. The Minuteman, I think, is going to really reverse the trend that weapon systems seem to have had in that the cost per missile, on location, is going to be far lower than any other system that is in development, to my knowledge. So I think the Minuteman will play a very important role in the total strategic system picture.

Mr. ROBACK. How do you rate the mobile Minuteman against the mobile Polaris? Perhaps that is a question that the Air Force could only answer in one way. [Laughter.]

But do you have any observations about it that might be helpful to the committee?

Dr. CHARYK. I think mobility has certain definite attractions. However, I think that the costs of the mobile system will significantly exceed the cost of fixed base systems, so that, in terms of the proper mix, we are going to have to have both types.

And the key questions degenerate into the proper balance between mobile and fixed systems.

Mr. HOLIFIELD. We won't pursue that matter further, but we may direct you a letter along that line.

We will close the hearings and, gentlemen, we wish to express our appreciation for your attendance here today and your responses to the questions. We are planning to have further hearings next week on the organization of MATS. I regret that we had to split our hearings today as we did and I appreciate your accommodation to the necessities of the Chair being on the floor today with the atomic energy legislation.

The meeting stands adjourned.

(Whereupon, at 6:40 p.m., the subcommittee adjourned.)

APPENDIXES

Appendix I—Replies From the Executive Branch of the Government to House Report No. 1121 (86th Cong., 1st Sess.)

The Secretary of Defense,
Washington, January 28, 1960.

Hon. Chet Holifield,
Chairman, Military Operations Subcommittee,
Committee on Government Operations.

Dear Mr. Chairman: In response to your request, the following comments, which also reflect the views of the Chairman of the Joint Chiefs of Staff, are offered with respect to the report of your committee on "Organization and Management of the Missile Program."

In general, the report is regarded by all interested elements of the Department of Defense as an excellent exposition of a very complex area and will, I am sure, contribute greatly to a better understanding of the many problems involved in the missile and space programs.

With respect to the recommendation for a merger of the Army and Air Force, I am in accord with the views of the interested military departments, which I understand have been made available to you. I do not believe that such a step is necessary or desirable. We believe that many of the problems set forth in the report have been met by recent actions, such as enactment of the Department of Defense Reorganization Act of 1958, which, in addition to clarifying lines of authority, established a Director of Defense Research and Engineering; the recent assignment of responsibility to the Air Force for the development, production, systems integration, and launching of space boosters; the assignment to the services of specific payloads for space applications; the transfer of responsibility for superboosters, including the proposed transfer of the Development Operations Division of the Army Ballistic Missiles Agency, to the National Aeronautical and Space Administration; and the reorientation of the role and organizational concept with respect to the Advanced Research Projects Agency.

I believe we now have a sound management framework within which we can continue to move forward in carrying out our responsibilities. This is not to say, however, that we feel our existing organization or management is perfect. In a fast-moving technology we expect changes to be required and, if so, we are prepared to make them, and to recommend new legislation if that be necessary.

We appreciate the opportunity you have afforded interested elements of the Department of Defense to review and comment on your report.

Sincerely yours,

Thomas S. Gates.

Department of the Army,
Washington, D.C., December 19, 1959.

Hon. Chet Holifield,
Chairman, Military Operations Subcommittee,
Committee on Government Operations,
House Office Building.

Dear Mr. Chairman: The Department of the Army appreciates the opportunity which you have affored to comment on House Report No. 1121, the report of the Committee on Government Operations entitled "Organization and Management of Missile Programs."

The committee report is a forthright and balanced review of organization, management, procurement, and related problems in the missile programs which have high national priority. The report is gratifying in its appraisal of the Army method of weapons system management and in its delineation of the necessity for the Armed Forces to maintain an "in house" capability for develop-

ment, technical management, and production. The committee study likewise describes clearly the problems and frictions which may ensue when developmental and operational responsibilities for a given weapon are not properly coordinated between different services. In its examination of these and other areas, the report offers constructive suggestions for improvement.

As you know, since publication of the committee report, important decisions have been made by the President and the Secretary of Defense concerning service, Department of Defense, and NASA responsibilities with respect to missile and space activities. These decisions have, in the Army's opinion, eliminated much of the duplication and friction in Army and Air Force programs and, therefore, have overtaken an argument for merger contained in the report.

The Army considers that the existing organization is a workable one for the present. The Secretary of Defense has the authority required to make decisions, and the current structure provides mechanisms which can be utilized for development and presentation to him of the many considerations bearing upon problems requiring his decision. As demonstrated by the recent decisions, remaining issues in the air defense and ballistic missiles fields can be resolved, if required, within this organization, utilizing authorities presently granted by law. Ths does not imply that changes may not be desirable in the future in order to meet the dynamic changes which are coming in the technological and military situations.

The impact on the "art of war" of the advent of the ICBM with its multimegaton warhead is not yet fully comprehended, but it is at least clear that a quantum jump in mass destructiveness is involved. This impact may mean, if fully adequate measures are taken to cope with it, that a state of virtual, pragmatic nuclear disarmament by mutual deterrence may be achievable. This, in turn, would mean that the operative elements of Communist and free world military power will rest increasingly in nonnuclear forces. It could, in fact, fully revalidate the strategic importance of the vast industrial mobilization potential of the North American Continent and, equally, the importance of Reserve forces backing up the Active Forces. Such considerations as these may not yet be fully clear, but such possibilities would indicate the wisdom of not making major modifications at this time in the defense structure which only recently has been reorganized.

It is in the light of the above considerations that the Army believes a merger with the Air Force into a single department is undesirable. In fact, in the current situation, it seems premature to initiate a formal study of the desirability of such a merger.

May I again compliment you and the committee on the penetrating and highly useful report which resulted from your examination of the missile programs.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

U.S. ARMY,
THE CHIEF OF STAFF,
February 9, 1960.

Hon. CHET HOLIFIELD,
Chairman, Military Operations Subcommittee,
Committee on Government Operations,
House of Representatives.

DEAR MR. CHAIRMAN: I very much appreciate your courtesy in requesting my views on House Report No. 1121, "Organization and Management of Missile Programs." I consider the subcommittee report to be an excellent review of the organization and management problems encountered in the various missile programs. Certainly, it is a straightforward and factual account of the Army's experience in these programs as I have known it.

As the subcommittee stated, the missile effort is only one of many aspects which would have to be examined in order to determine if merger of the Army and Air Force is a wise course of action. From the overall viewpoint, I have come to the conclusion that such a merger is undesirable. Three principal considerations have led me to this conclusion.

First, the Department of Defense has only recently completed a major reorganization aimed, in part, at improving the JCS structure. I believe that this new organization should first be given a thorough test before any further fundamental alterations are considered. If such alterations as a merger of

the Army and Air Force appear desirable at a later time, they should be evolutionary rather than revolutionary.

Secondly, the principal problems confronting DOD today are not really organizational, but stem instead from basic differences of opinion with respect to the military posture and the allocations of resources required to meet the threat to our national security. These differences of opinion exist because competent individuals, after the examination of all the pertinent considerations, disagree sincerely and deeply concerning both the precise nature of the threat and the strategy which should be adopted to meet it. For instance, I believe that as we move into the 1960's, the requirement for not only an invulnerable nuclear retaliatory force, but also a more flexible capability for operations short of general nuclear war is becoming increasingly apparent. While the full impact of the coming period of poised and counterpoised ICBM's is not yet fully discernible, the growing importance to our national posture of conventional land forces armed with, but not solely dependent upon, tactical atomic weapons is, in my view, unmistakable. In any event, differences in opinion on these matters which are of profound importance to the continued security of our Nation would remain under any organizational changes, and it would seem unwise to me to try to force their resolution by organization rather than logical means.

Lastly, I am of the opinion that the Joint Chiefs of Staff should be continued essentially as at present since each service chief brings to the corporate body of the Joint Chiefs of Staff not only the professional skill associated with his specific service, but also the responsibilities inherent in his service assignment. This blending of the various services' experience and responsibility is essential to thorough consideration of the complex problems involved in providing for our national security. A merger of the Army and Air Force would, of course, affect the current composition of the Joint Chiefs.

In conclusion, let me repeat that I consider the subcommittee report a most excellent analysis of the subject which it considered, but I do not believe that further study of Army-Air Force merger is warranted at this time.

With regards and best wishes,

Sincerely,

L. L. LEMNITZER,
General, U.S. Army, Chief of Staff.

HEADQUARTERS,
U.S. ARMY ORDNANCE MISSILE COMMAND,
Redstone Arsenal, Ala., January 29, 1960.

Hon. CHET HOLIFIELD,
Chairman, Military Operations Subcommittee of the Committee on Government Operations, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: Permit me to congratulate you on the quality and utility of your committee's report on "Organization and Management of Missile Programs." You have uncovered and presented, in meaningful interrelations, facts that long have needed airing. The report reflects a capacity for understanding complex subject matter and a talent for communicating that understanding to others which are worthy of the highest professional standards.

Sincerely yours,

J. B. MEDARIS,
Major General, USA, Commanding.

DEPARTMENT OF THE NAVY,
OFFICE OF THE SECRETARY,
Washington, D.C., November 5, 1959.

MY DEAR MR. CHAIRMAN: This is in reply to your letter of September 4, 1959, which forwarded the report of your committee on "Organization and Management of Missile Programs." I appreciate your courtesy in bringing the report to my attention.

Your committee is to be commended for documenting a very complex subject. I believe the report will serve as an excellent reference for study of the history of the ballistic missile program.

The ever-changing complexion of modern weapons calls for a periodic review by the military departments of their organizational and management arrangements. As mentioned in your report, the Navy's latest review took place in 1958. The Committee on Organization of the Department of the Navy recommended, among other things, the merger of the Bureau of Ordnance and the Bureau of Aeronautics into the Bureau of Weapons, and creation of a Deputy Chief of Naval Operations for Development. These two recommendations were approved and have been implemented. We believe that these new organizations will reduce leadtime between the expression of an operational requirement and delivery to the combat forces of a fully developed and effective weapon or weapons system. The Navy will continue to review its organization to insure maximum combat effectiveness and administrative efficiency and will make such changes as are warranted.

The committee has properly recognized that there are no simple, small remedies for the big problems. The Department of the Navy's contribution to the national defense demands firm control of the seas to permit the projection of U.S. power from the seas and to insure the uninterrupted passage of the commerce of war required for the support of operations overseas by our Army and Air Force and by our allies. This capability to contol and use the seas is applicable to a general war, whether atomic or conventional, to a series of limited-war actions, or to a cold war where selective demonstration of strength is required of national policies.

In the accomplishment of its mission, the Navy has unique problems of technology, command, and organization. The report properly recognizes the profound environmental differences between land-based and naval forces. It is difficult for me to envision any strategic circumstances or technological developments that will dictate the need for a single service organization. The power of decision and control of advice on these vital matters of basic national security must not become the monopoly of any particular faction.

In a comprehensive report, such as yours, there are many points raised that, while controversial, are of primary concern to the Departments of the Army and the Air Force. I feel that it would be inappropriate for me to comment on such matters.

Sincerely yours,

W. B. FRANKE,
Secretary of the Navy.

HON. CHET HOLIFIELD,
Chairman, Military Operations Subcommittee, Government Operations Committee, House of Representatives, Washington, D.C.

CHIEF OF NAVAL OPERATIONS,
October 22, 1959.

DEAR MR. CHAIRMAN: This is in reply to your letter of September 4, 1959, which requested my comments on House Report 1121, "Organization and Management of Missile Programs," prepared under your direction.

Though the Navy would not be directly involved if the principal recommendation of the report were adopted, as a partner in the defense team we are, of course, deeply interested in any measures to improve the national security.

Your report recognizes, I believe, the Navy's unique role in the national security partnership. The operating environment of the sea is greatly different from that of the Army and Air Force. This environmental difference is of fundamental significance, and its controlling importance will continue as far into the future as we can see. Technology, organization, and command of seagoing forces and sea-based weapons systems present requirements basically distinct from those of landbased elements. Only if we profoundly understand the sea environment and imaginatively pursue its special possibilities and problems, will we effectively wield the immense present capacity of naval power for achieving our national aims, and realize its even greater future potential.

Since World War II, the United States, a maritime nation at the heart of a great oceanic system of alliances, has been able to maintain international stability to the degree that it has shown itself able and willing to apply its power overseas. It is significant that landlocked areas such as Hungary and Tibet, relatively inaccessible to naval strength, have fallen during Communist crises, while states with access to the open seas, from Korea around to NATO, have stood firm, supported by maritime power.

It is for these reasons, Mr. Chairman, that I cannot agree with proposals, sometimes advanced, which make no provision for the balanced, integrated naval organization and command structure essential to the preservation of U.S. national supremacy in the age of missiles, and which cannot assure full consideration at the highest politically responsible levels of the unique capabilities and specialized organiaztional and command requirements of naval forces.

Conversely, I would be loathe to have our Army and Air Force forced into a naval organizational arrangement. They, too, have special features which should be fully considerd at the highest level by our executive and legislative branches.

Strategic determinations involving the security of the United States are made at the seat of government. Those making these determinations need all available information and advice on which to base the far-reaching decisions which will set the course of our Nation for years to come. We cannot be sure of being right, since human beings are involved and human beings make mistakes. We can, however, be sure that our system provides the soundest possible organizational structure for decisionmaking. This includes insuring that the highest politically responsible authorities, the President and the Congress, in making their fundamental decisions, know what the issues are and what the decisions will involve. It includes providing a forum, our corporate Joint Chiefs of Staff, where strategic questions are comprehensively studied and debated by responsible professional advocates of the chief alternatives, and where the resulting recommendations are forwarded to politically responsible civilian authority, with full information on divergencies if any divergencies remain. Our national survival and our responsibilities to mankind are too important to entrust the power of decision or the control of strategic advice to a single, regimented group or clique.

Your report's key recommendation, of course, is the remerger of the Army and the Air Force. It is quite possible that these services may indeed find that a closer relationship would assist them to solve many of their mutual problems. You present persuasive evidence to that effect from the area of the missile programs. Perhaps they might find it a logical step to move toward an arrangement similar to the close and fruitful relationship between the Navy and Marine Corps within the Department of the Navy. In any case your recommendation deserves, and will surely receive, their close study.

From the Navy standpoint, the organizational arrangements between the Army and the Air Force are for them to study and recommend, subject always to the requirements discussed in the foregoing paragraphs, i.e., maintenance of the corporate JCS, authoritative decision by politically responsible civilian authority after full information on all sides of the question, integrity of the specialized naval organization and comand structure to insure effective naval contribution to unified combat operations, and prevention of a dangerous, politically powerful, military monopoly.

Your report is a most thorough, comprehensive, and illuminating exposition of the history, organization, and management of the missile programs. It will long be an invaluable reference work in its area.

I hope these views will be helpful to you.

Sincerely,

ARLEIGH BURKE.

Hon. CHET HOLIFIELD,
House of Representatives,
Washington, D.C.

DEPARTMENT OF THE NAVY,
HEADQUARTERS U.S. MARINE CORPS,
Washington, D.C., October 27, 1959.

Hon. CHET HOLIFIELD,
House of Representatives,
Washington, D.C.

MY DEAR MR. HOLIFIELD: I am taking this first opportunity, since my return to Washington, to respond to your request for comment on House Report No. 1121 on "Organization and Management of Missile Programs" prepared by the Military Operations Subcommittee under your chairmanship.

The report is truly impressive in its scope and depth. It provides a valuable appreciation of the dimensions and complexity of problems of missile manage-

ment. As the report reflectively points out, administrative perfection in the management of our problems of weapons and organization is as elusive as Utopia. I am in full sympathy with the sober approach taken by your study in recognizing the limits of the unipurpose strategic missile for the various and pressing tasks of national defense. Of necessity most tasks must be decentralized in preparing forces for war.

I am convinced that our Nation requires an adequate strategic nuclear deterrent; the missile obviously has a key role in this purpose. Certainly the minds and resources of this country must be vigorously applied to achieve an optimum missile capability. You may know that previously I have often stated my conviction of the need for a balanced national defense and have likewise spoken my mind on the dangers of an inflexible national strategy. I note with satisfaction that the report is mindful of these concerns.

As you know, the Marine Corps' use of missiles is limited to the short-range, tactical missiles for air and ground targets—those missiles which are required to enhance our capabilities for amphibious, force-in-readiness missions. Those programs in which the Marine Corps is currently participating are progressing satisfactorily.

In regard to the proposal for statutory combination of the present Departments of the Army and the Air Force, I feel that such combination does not directly concern the organization, administration, and operations of the Marine Corps.

Please be assured that I am grateful for your consideration in making the report available to me and affording me the opportunity to offer comment.

Very sincerely,

R. McC. PATE,
General, U.S. Marine Corps,
Commandant of the Marine Corps.

DEPARTMENT OF THE AIR FORCE,
OFFICE OF THE SECRETARY,
Washington, December 4, 1959.

DEAR MR. CHAIRMAN: General White and I have read, with much interest, your report of September 2, 1959, on the organization and management of missile programs. This report is, we believe, a document which will be of great value to persons in the Department of Defense and elsewhere in the Government who are attempting to understand the many problems associated with our missile and space programs.

The Air Force is, of course, particularly interested in your discussion and recommendations relating to the future role and status of Space Technology Laboratories in the Air Force missile and space programs and to the possible merger of the Army and the Air Force into a single service.

With respect to the Air Force's utilization of Ramo Wooldridge Corp. and Space Technology Laboratories in the development of operational ballistic missiles, your report indicates a most gratifying appreciation that the bold and incisive action taken in this respect by the Air Force at the critical period in 1954, when our ICBM program was commenced on a priority basis, has materially contributed to the successful development of strategic ICBM and IRBM missiles in what can fairly be described as record time. The contribution of R/W and STL to the Air Force strategic missile program, and hence to the defense and well-being of the United States, has been great. We thoroughly agree with your conclusion that R/W (and STL) "can take pride in its own right for what it has done for the United States."

In utilizing R/W and STL as the organization having systems engineering and technical responsibility for our missile programs, the Air Force has fostered the development within those organizations of a high degree of skills and experience in the field of missile and space technology which is unique and which would be extremely difficult to replace. This capability now residing in STL must, we believe, be regarded as a valuable asset to this Nation in its struggle for weapons superiority. Our missile and space programs are as compelling today as they were in 1954 when R/W was requested to serve the Air Force in the role that STL now occupies. I am certain your committee agrees that it is important to preserve and utilize such capability wherever it can best serve the national interest.

As indicated in your report, the Air Force has from the very beginning of its relationship with R/W and STL recognized the several problems inherent

in that relationship which are discussed in your report. Our experience is that no single form of management in this area is free from problems. In the case of STL it is my intention to make every effort to resolve these difficulties in such a way that the capabilities developed by STL will be preserved in the national interest. For this purpose, I have established a special committee, headed by Dr. Clark B. Millikan, to examine into the role of STL and to advise as to the future relationship and scope thereof. You can be certain that your report and the recommendations with respect to STL contained therein are receiving the careful consideration of both myself and this committee.

With respect to your recommendation on the merger of the Army and the Air Force, there is a keen awareness within the Department of Defense of the importance of clearly delineating the strategic missile and space functions among the various component organizations of the Department and of so marshaling our resources and capabilities that we minimize the problems which appear to you to result from maintaining the Army and the Air Force as separate entities. The Department of Defense Reorganization Act of 1958, which strengthened and clarified the authority of the Secretary of Defense and established a Director of Defense Research and Engineering, was a positive step in this direction. On September 18, 1959, the Secretary of Defense by memorandum for the Chairman of the Joint Chiefs of Staff entitled, "Coordination of Satellite and Space Vehicle Operations," clarified the role and responsibilities of the Advanced Research Projects Agency and the military departments in the area of satellite and space vehicle operations. This memorandum assigned to the Air Force responsibility for development, production, and launching of space boosters and the necessary systems integration incident thereto. It also made assignments among the military departments of specific payloads for space and satellite systems. These actions, coupled with the DOD–NASA agreement, approved by the President on November 2, 1959, involving the transfer to NASA of the Development Operations Division of the Army Ballistic Missile Agency, should, we believe, resolve the problems with which your report is concerned. With respect to the missile and space programs we see no useful purpose that could be served by merger of the Army and the Air Force and, in any event, as recognized in your committee report, any reorganization proposal involving the merger of the military services would require consideration of a number of important factors unrelated to missile and space functions.

Your report makes certain conclusions with respect to the technical resources of the Air Force in the field of strategic missiles and space systems. General Schriever, commander, ARDC, has furnished me with a memorandum, which, among other things, deals with this subject. We agree with his views that Air Force technical resources are second to none.

Again let me say that your report will be of great value to all who are considering the organization and management of our missile programs.

Sincerely yours,

JAMES H. DOUGLAS,
Secretary of the Air Force.

Hon. CHET HOLIFIELD,
Chairman, Military Operations Subcommittee,
Committee on Government Operations,
House of Representatives.

HEADQUARTERS, AIR RESEARCH AND DEVELOPMENT COMMAND,
U. S. AIR FORCE,
ANDREWS AIR FORCE BASE,
Washington, D.C., November 5, 1959.

MEMORANDUM FOR SECRETARY DOUGLAS

Subject: House Report No. 1121, dated September 2, 1959 (Mr. Holifield's committee).

1. In transmitting to the Department of Defense and the three services House Report No. 1121, "Organization and Management of Missile Programs," dated September 2, 1959, Mr. Holifield asked for any comments we might care to make. After carefully studying the report, I believe that some constructive comments can and should be made by the Air Force relative to the role of the Space Technology Laboratories in the Air Force ballistic missile program and the technical resources which the Air Force has to offer in the area of ballistic missile and space system programs.

2. With respect to the former (STL), the testimony seems to have failed to clearly establish a very significant fact—that is, it was the urgent ICBM requirement coupled with the lack of organic capability within any one military, industrial, or scientific organization to carry out the required ICBM system engineering and technical direction that led to the original contract with Ramo-Wooldridge. The Air Force, with the advice and counsel of the von Neumann committee, which it had the foresight to call to its assistance, immediately recognized the intricacies and complexities of this problem and took bold decisive action.

3. This action was to assign highest priority to the ICBM program and to marshal in the shortest possible time the best scientific-industrial-military team that has ever been assembled in peacetime. To do this, we had to bring science and industry into the program on an equitable basis as full-time partners. I believed, and still do, that for the Government to maintain an in-house capability for detailed design, engineering, and prototype production of modern aerospace weapon systems results in greater costs, lower quality weapon systems, and a much longer time after development has been initiated before the weapon systems can be ready for operational use.

4. The management approach the Air Force took in 1954 to the development and production of strategic range ballistic missiles has been phenomenally successful in lead time. While developing and producing the urgently required strategic ballistic missiles, it has at the same time by taking maximum advantage of our competitive free enterprise system created for this country a vast scientific-industrial base which today provides more than 90 percent of the aerospace hardware, facilities, and trained personnel essential to our technological competition with communism. These accomplishments tell more eloquently than any number of words the depth and range of Air Force thought and planning during the past 5 years.

5. The problems inherent in the STL relationship with the Air Force and its associate contractors were recognized from the start and safeguards established. Because of the merger of Ramo-Wooldridge and Thompson Products, it was necessary to strengthen the safeguards and extend them to include the new Thompson Ramo Wooldridge, Inc.—this was done. From the point of view of the Air Force, the safeguards are working very well and the Government's interests are protected.

6. The matter of the future relationship of STL to the Air Force has been under constant study and scrutiny since the inception of the first contract with Ramo-Wooldridge. Dr. Clark B. Millikan, at your request, is chairing a committee composed of several scientists and executives who are looking into this matter. Divestiture of STL by TRW and whether it is possible or, for that matter, wise to attempt to convert STL to a nonprofit corporation or foundation is of prime interest to this committee and the Air Force.

7. With respect to Air Force technical resources, it should be noted that Air Force testimony was essentially confined to matters concerning STL and its role in the Air Force ballistic missile program. To complete the record, I believe it important to bring to the Holifield committee's attention the true extent of our technical resources. Within the Air Research and Development Command alone the Air Force has some 44,200 personnel. The breakdown of ARDC personnel showing the educational level of the officer and civil service scientists and engineers responsible for the operating management and direction of the Air Force's vast aerospace research and development program together with its more than $1.7 billion worth of Government facilities and equipment gives a partial indication of the aerospace scientific technical resources of the Air Force.

Air Research and Development Command, personnel

Total	44,297
Military:	
Officers	5,844
Airmen	15,292
Civilian:	
Graded	14,444
Wage board	8,717
Technical officers [1]	3,406
Technical airmen [1]	8,109
Technical civilians [1] (5,000 scientists and engineers)	10,288

[1] The above includes engineers, scientists, and technicians.

EDUCATIONAL LEVELS OF ALL ARDC OFFICERS

Seventy-five percent have at least a bachelor degree.
Twenty-five percent have at least a master's degree.
Three percent have a Ph. D. degree.

EDUCATIONAL LEVELS OF TECHNICAL OFFICERS

Ninety-three and five-tenths percent have at least a bachelor degree.
Thirty-four and five-tenths percent have at least a master's degree.
Two and five-tenths percent have a Ph. D. degree.

CIVILIAN SCIENTISTS AND ENGINEERS (5,000)

Ninety-two percent have at least a bachelor degree.
Twenty-six percent have advanced degrees.

8. Add to the above the capability in procurement, production, and maintenance found in the Air Materiel Command and it immediately becomes clear even without considering the technical resources located in other commands, that Air Force technical resources are second to none.

Sincerely,

B. A. SCHRIEVER,
Lieutenant General, USAF, Commander.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., September 21, 1959.

Hon. CHET HOLIFIELD,
Chairman, Military Operations Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.

MY DEAR MR. HOLIFIELD: House Report No. 1121 (86th Cong., 1st sess.) on "Organization and Management of Missile Programs" has been received and the opportunity to make comments on the report to the subcommittee is very much appreciated.

A careful reading of the report reveals a comprehensive review of a very broad and difficult area. A concise and fairminded analysis of major difficulties is of great assistance to all who are interested in the solution of these vital problems. You can be sure that full consideration will be given to your recommendations.

Sincerely yours,

MAURICE H. STANS, *Director.*

APPENDIX II—REPRESENTATIVE RESPONSE FROM INDUSTRY TO HOUSE REPORT NO. 1121 (86TH CONG., 1ST SESS.)

SANDIA CORP.,
Sandia Base, Albuquerque, N. Mex., January 8, 1960.

Hon. CHET HOLIFIELD,
House of Representatives,
Washington, D.C.

DEAR MR. HOLIFIELD: Thank you for sending us copies of your report, "Organization and Management of Missile Program." I have read the report carefully and with great interest. Having personally participated to some extent in both the ICBM and air defense programs and being involved more recently in the AEC part of these programs, I was able to relive, so to speak, many of the events described in your report and compare your statements with impressions of these events as they remain in my memory.

Let me say right off that I think your report is a very good one. It is first of all an excellent compilation of the events leading up to the present situation, accurate and in good detail, yet very readable and salted with amusing and incisive side remarks. The general impression the reader will gain from it, I believe, is that problems in managing our missile programs have arisen not so much from the stupidity of the individuals responsible (although there has been some of that), nor from the greed for personal profit in industry (although there has been some of that), nor from bitter interservice rivalry and jealousy

(although there has been plenty of that). The basic problems transcend these simple explanations. They stem, first of all, from the critical importance of modern weapons to the defense of our country, the free world, and our very way of life; from the high cost in dollars of modern weapons; and from the steady and relentless yet unpredicable advance of modern technology which makes planning ahead so difficult. How can one judge what is waste and what is necessary risk in these circumstances? How does one best organize to something never before done? Who can deny that to get anything "done" in this complicated situation requires forceful leaders, who of necessity must probably overstate their cases and sometimes step on a few toes?

There is, of course, much to be criticized in the management of our missile programs. But such criticism should be based on a full knowledge of the whole program. Your report will, I am sure, serve to bring sanity into future discussions and investigations of this problem.

As to your recommendations on what should be done, they are, as I read them, mainly that of recombining the Army and Air Force. I can see much to be said for such action. Presumably it would place the decision-making process for many of our weapons into strictly line organizations where the capability exists for enforcing a decision once made. There would still be rivalry between various subbranches (such as we now see, say, in the various Bureaus of the Navy), but at least there is a top boss available who can straighten these all out in-house.

Personally, I would prefer a unification of all three services and then a redefinition of missions for the subunits along the lines of (1) Strategic Retaliatory Forces (including SAC, ICBM's, IRBM's, and Polaris; (2) Mobile Striking Forces (including conventional Army troops, Marine Corps, TAC, and the necessary transportation services); (3) Defense of the High Seas (mainly conventional Navy); (4) Defense of the Home Base (including Air Defense, Missile Defense, ASW as it relates to defense of our shores, and the National Guard); and finally (5) a Supply and Training service. I realize that new weapons and changes in our international situation could well make obsolete this definition of missions. Yet it seems to me that there might be usefully long periods of time in which they would eliminate much of the ambiguity in function for the three services that we now have.

Besides bearing on the problem of reorganization of our military services, I believe your study is useful in shedding light on the question of "parallel" weapon programs and when they make sense. One should distinguish whether competing or backup programs are desirable or necessary because they represent different technical approaches or because they are to be done by different organizations (in neither of which, presumably, we have full confidence). I would hope that when large sums of money are involved, the latter reason is not justifiable, although I must admit that history has certainly shown cases in which a basically good idea was goofed up and delayed by poor execution and vice versa.

We can look at two parallel programs discussed in your report, namely, the Thor-Jupiter, and the Atlas-Titan. The Thor and Jupiter missiles differ, of course, mainly in minor details (the nose cone being the biggest), both of them accomplishing the same result in essentially the same way. Both of them were actually developed by competent organizations of proven performance. Duplication here was asinine.

In the case of the Atlas-Titan parallelism, the problem was a little different. The stakes were higher, the problems more difficult, and as it happens, some of the organizations involved were less experienced.

With the exquisite precision of hindsight, it is clear that Titan in its technical design was also too close to that of Atlas. To be sure, its rigid structure and two-stage configuration represented some technical advance, but not much. In nose cone design (G.E. versus Avco) there was hardly a difference until the Army's ablation scheme was picked up, the engines were very similar even if built by another company, and the radio guidance schemes, though rather different, both looked workable quite early in the game.

Clearly there is need in the management of these programs to have leadership which will have the judgment and courage to make decisions when required on the side of conservatism and equally on the side of technical risk. A job is not necessarily hedged by carrying parallel programs of similar approaches. More often these slow down the main effort. Fortunately there can be several solutions to many technical problems all more or less equally workable if proper effort is focused on them.

In the end, as in most things, the problem reduces to one of finding the proper leadership—people who have the technical background for judging technical problems, but also the feeling for the organizational and production problems of driving a big job through to completion. But mostly it is a matter of guts, drive, a willingness to take risks, and an ability to persuade others of the merits of their approach.

I enjoyed getting to know you better in your last visit here, and I hope that there will be future opportunities for us to discuss these and other problems.

Cordially,

J. P. MOLNAR.

HYCON MANUFACTURING CO.,
Pasadena, Calif., October 1, 1959.

Mr. HERBERT ROBACK,
Staff Administrator, Military Operations Subcommittee, 201 George Washington Inn, Washington, D.C.

DEAR MR. ROBACK: Many thanks for sending me a copy of the subcommittee's missile report. This is one of the most interesting documents I've seen out of Washington in some time.

Sincerely yours,

TREVOR GARDNER.

AERONCA MANUFACTURING CORP.,
Washington, D.C., December 10, 1959.

Mr. HERBERT ROBACK,
Staff Administrator, Military Operations Subcommittee,
House of Representatives, New House Office Building, Washington, D.C.

DEAR MR. ROBACK: I want to thank you very kindly for the time you spent discussing the committee's report on "Organization and Management of Missile Programs." Your comments were most enlightening and of interest to me.

Again, let me say that I think the report you published on the "Organization and Management of Missile Programs" was excellently presented, and certainly contained a great amount of thought and constructive direction.

I hope that I have the opportunity of seeing you in the near future.

Very truly yours,

JOHN P. LAWLER, *Vice President.*

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.,
Washington, D.C., September 16, 1959.

Hon. WILLIAM L. DAWSON,
Chairman, Committee on Government Operations,
House of Representatives, Washington, D.C.

DEAR MR. DAWSON: Please permit me to compliment you, your committee and its staff, upon the clarity and objectivity of the 11th report by your committee entitled "Organization and Management of Missile Programs."

This is the finest congressional report of its kind that I have seen and should serve as an extremely valuable source of information for people in Government and in industry who are concerned with national defense problems.

Very respectfully yours,

ORVAL R. COOK.

SPACE TECHNOLOGY LABORATORIES, INC.,
Los Angeles, Calif., September 14, 1959.

Mr. HERBERT ROBACK,
Staff Administrator, Military Operations Subcommittee of the Committee on Government Operations, House Office Building, Washington, D.C.

DEAR MR. ROBACK: Am just in receipt of your note of the 8th and copy of the report of the Committee on Government Operations dealing with organization and management of missile programs.

Have perused the report and find that it is indeed a very well written record of our national missile and space activities.

With every good wish, I am,

Very sincerely,

J. H. DOOLITTLE

Appendix III—Department of Defense Directives and Instructions

December 30, 1959
NUMBER 5129.33

AdmAsst,S/D

Department of Defense Directive

SUBJECT Department of Defense Advanced Research Projects Agency

I. GENERAL

Pursuant to the authority vested in the Secretary of Defense and the provisions of the National Security Act of 1947, as amended, including the Department of Defense Reorganization Act of 1958, an Advanced Research Projects Agency is hereby established as an operating research and development agency of the Department of Defense under the direction and supervision of the Director of Defense Research and Engineering.

II. ORGANIZATION AND RESPONSIBILITY

The Advanced Research Projects Agency will be separately organized within the Department of Defense under a Director of Advanced Research Projects appointed by the Secretary of Defense. The Agency will be responsible for basic and applied research and development for such advanced projects as the Director of Defense Research and Engineering assigns.

III. FUNCTIONS

Under the direction and control of the Director of Advanced Research Projects, the Agency will perform the following functions within its assigned field of responsibility:

1. Engage in assigned advanced research projects.

2. Arrange for the performance of and supervise the work connected with assigned advanced projects by the military departments, other Government agencies, individuals, private business entities or educational or research institutions, giving

consideration to the primary functions of the military departments.

3. Recommend to the Director of Defense Research and Engineering the assignment of advanced projects to the Agency.

4. Keep the Director of Defense Research and Engineering, the Joint Chiefs of Staff, the military departments and other DOD agencies informed, as appropriate, on significant new developments, break-throughs and technological advances within assigned projects and on the status of such projects in order to facilitate early operational assignment.

5. Such other functions as the Secretary of Defense or the Director of Defense Research and Engineering assigns.

IV. RELATIONSHIPS

A. In the performance of its functions, the Agency shall:

1. Coordinate actions, as appropriate, with the military departments and other DOD agencies having collateral or related functions in the field of its assigned responsibility.

2. Maintain active liaison for the exchange of information and advice in the field of its assigned responsibility with the military departments, other DOD agencies and appropriate research and development agencies outside the Department of Defense, including private business entities, educational or research institutions or other agencies of Government.

3. Make full use of established facilities in the Office of the Secretary of Defense, military departments and other DOD agencies rather than unnecessarily duplicating such facilities.

B. Officials of the Office of the Secretary of Defense, military departments and other DOD agencies shall provide support, within their respective fields of responsibility, to the Director of Advanced Research Projects as may be necessary to carry out the assigned responsibilities and functions of the Agency.

V. AUTHORITIES

A. The Director of Advanced Research Projects, in the assigned field of responsibility of the Agency, is hereby specifically delegated authority to:

1. Place funded work orders with the military departments or other DOD agencies, or directly with subordinate activities of the military departments, after clearance with the Secretary of the department concerned.

2. Enter into agreements with other Government agencies for basic and applied research and development work connected with assigned advanced projects.

3. Authorize the allocation, transfer or expenditure of funds made available to the Agency for assigned advanced projects.

4. Establish for the Agency and with the military departments and other research and development activities such procedures as are required in connection with work being performed for the Agency consistent with policies and instructions governing the Department of Defense.

5. Acquire or construct such research, development and test facilities and equipment as are required to carry out his assignments and as may be approved by the Secretary of Defense in accordance with applicable statutes.

B. Other authorities specifically delegated by the Secretary of Defense to the Director of Advanced Research Projects in other directives will be referenced in an inclosure to this directive.

VI. PROJECT ASSIGNMENTS

Announcements of the assignment of projects to the Advanced Research Projects Agency by the Director of Defense Research and Engineering will be made from time to time by numbered inclosures to this directive.

VII. SUPPORT

Such personnel, facilities and funds as the Secretary of Defense deems necessary will be made available to the Advanced Research Projects Agency for the performance of its assigned responsibilities.

VIII. CANCELLATION

DoD Directive 5105.15, dated March 17, 1959, except for inclosures numbered 3, 4, 5, 7, 8, 9, 10, 14 and 16, is hereby cancelled. The above numbered inclosures which are excepted from this cancellation will be renumbered 2 through 10, respectively, and will remain in effect as inclosures to this Directive until otherwise modified or rescinded by the Director of Defense Research and Engineering.

IV. EFFECTIVE DATE

This Directive is effective upon publication.

Thomas S. Gates
Secretary of Defense

Dec 30, 59
5129.33 (Incl 1)

Reference to Other Authorities Specifically Delegated by the Secretary of Defense to the Director of Advanced Research Projects Agency in Other Directives

No other authorities have been specifically delegated by the Secretary of Defense to the Director of Advanced Research Projects Agency as of the date of this directive. Any future specific delegations will be referenced in an inclosure to this directive.

Dec 30, 59
5129.33 (Incl 1A)

Project Assignments

Project Designation (Short Title)	Inclosure No.
NOTUS	2
TRANSIT	3
TRIBE	4
DEFENDER	5
PRINCIPIA	6
PONTUS	7
LONGSIGHT	8
(Classified)	9
(Classified)	10

DEPARTMENT OF DEFENSE
DIRECTIVES SYSTEM TRANSMITTAL

NUMBER	DATE	DISTRIBUTION
5129. 33 - Ch 1	January 6, 1960	5129

ATTACHMENTS

Inclosure 11 to DoD Directive 5129. 33

INSTRUCTIONS FOR RECIPIENTS

The Director of Defense Research and Engineering approved the attached project assignment to the Advanced Research Projects Agency on January 4, 1960:

PAGE ADDITION

Incorporate the attached assignment "SUNRISE" as Inclosure 11 to DoD Directive 5129. 33, "Department of Defense Advanced Research Projects Agency," dated December 30, 1959

PEN ADDITION

Add the following listing to the Table of Contents (Inclosure 1A) to DoD Directive 5129. 33:

Short Title	Inclosure No.
SUNRISE.....	11

Maurice W. Roche
MAURICE W. ROCHE
Administrative Secretary

WHEN PRESCRIBED ACTION HAS BEEN TAKEN, THIS TRANSMITTAL SHOULD BE DESTROYED.

SD FORM 1 JUL 54 106-1 PREVIOUS EDITIONS ARE OBSOLETE

Jan 6, 60
5129.33 (Incl 11)

PROJECT ASSIGNMENT TO ARPA

1. Project Designation:

Basic Defense Research Short Title: SUNRISE

2. Project Description:

The Advanced Research Projects Agency, on behalf of the Department of Defense, will undertake analyses and investigations to identify and make contributions of a conceptual nature to the basic technical problems vital to national defense which may not now be receiving adequate attention by the scientific community and to advise the Secretary of Defense through the Director of Defense Research and Engineering of scientific developments on which projects might be initiated which would enhance the national security.

3. Specific Provisions or Instructions:

Approval by DDR&E will be required for work beyond the initial study phase.

DEPARTMENT OF DEFENSE
DIRECTIVES SYSTEM TRANSMITTAL

NUMBER	DATE	DISTRIBUTION
5129.33 - Ch 2	March 22, 1960	5129

ATTACHMENTS

Inclosure 12 to DoD Directive 5129.33, December 30, 1959

INSTRUCTIONS FOR RECIPIENTS

The Director of Defense Research and Engineering approved the attached project assignment to the Advanced Research Projects Agency on February 23, 1960:

PAGE ADDITION

Incorporate the attached assignment "STRIVE" as Inclosure 12 to DoD Directive 5129.33, "Department of Defense Advanced Research Projects Agency," dated December 30, 1959.

PEN ADDITION

Add the following listing to the Table of Contents (Inclosure 1A) to DoD Directive 5129.33:

Short Title	Inclosure No.
STRIVE.....	12

Maurice W. Roche

MAURICE W. ROCHE
Administrative Secretary

WHEN PRESCRIBED ACTION HAS BEEN TAKEN, THIS TRANSMITTAL SHOULD BE DESTROYED.

SD FORM 1 JUL 56 106-1 PREVIOUS EDITIONS ARE OBSOLETE

Mar 22, 60
5129.33 (Incl 12)

PROJECT ASSIGNMENT TO ARPA

1. Project Designation:

Reliability Studies for Satellite Systems Short Title: STRIVE

2. Project Description:

The Advanced Research Projects Agency, on behalf of the Department of Defense, will undertake to obtain independent preliminary reliability analyses for TRANSIT, NOTUS and for selected subsystems under SAMOS and MIDAS; and will undertake to maintain continuing reliability analyses and monitoring programs for the noted systems with the objectives of providing necessary information for the Director of Defense Research and Engineering, and assisting the reliability efforts of the agencies and contractors involved.

3. Specific Provisions or Instructions:

In performing this project ARPA will maintain close general liaison with the Director of the Office of Electronics, ODDR&E, particularly with respect to electronic component development efforts which may need to be initiated for assuring improved reliability of the systems of interest.

56061 O—60——13

DEPARTMENT OF DEFENSE
DIRECTIVES SYSTEM TRANSMITTAL

NUMBER	DATE	DISTRIBUTION
5129. 33 - Ch 3	July 15, 1960	5100

ATTACHMENTS

Inclosure 13 to DoD Dir 5129. 33, Dec 30, 59.

INSTRUCTIONS FOR RECIPIENTS

The Director of Defense Research and Engineering approved the attached project assignment to the Advanced Research Projects Agency on July 11, 1960:

PAGE ADDITION

Incorporate the attached assignment "LORRAINE" as Inclosure 13 to DoD Directive 5129. 33, "Department of Defense Advanced Research Projects Agency," dated December 30, 1959.

PEN ADDITION

Add the following listing to the Table of Contents (Inclosure 1A) to DoD Directive 5129. 33:

Short Title	Inclosure No.
LORRAINE	13

Maurice W. Roche

MAURICE W. ROCHE
Administrative Secretary

WHEN PRESCRIBED ACTION HAS BEEN TAKEN, THIS TRANSMITTAL SHOULD BE DESTROYED.

SD FORM 1 JUL 54 106-1 PREVIOUS EDITIONS ARE OBSOLETE

Jul 15, 60
5129.33 (Incl 13)

PROJECT ASSIGNMENT TO ARPA

1. Project Designation:

Research in Advanced Energy Conversion Short Title: LORRAINE

2. Project Description:

The Advanced Research Projects Agency, on behalf of the Department of Defense, will undertake research in advanced energy conversion on a continuous basis which will support the advanced program needs within the Department of Defense.

3. Specific Provision or Instructions:

Work on this project beyond the extension of current contracts, established under a previous assignment, will be cleared with ODDR&E in order to prevent duplication with military department programs.

NUMBER 5129.34
DATE April 7, 1960

DDR&E

Department of Defense Instruction

SUBJECT Central Supervision of Ground Environment Equipment and Technical Facilities

I. PURPOSE

The purpose of this Instruction is to provide centralized supervision of all ground environment equipment and facilities for support of missile and space development and test programs, and coordination of all ground environment equipment and facilities for all other space programs.

II. DEFINITION

"Ground environment support" refers to that equipment, instrumentation and technical facilities required to launch, detect, track, communicate with, control, perform computations upon, catalog data of, and recover missiles and vehicles.

III. ORGANIZATION

There is hereby established within the Office of the Director of Defense Research and Engineering an Assistant Director (Ranges and Space Ground Support) with responsibilities, functions and authorities as prescribed herein.

IV. RESPONSIBILITIES

The Assistant Director (Ranges and Space Ground Support) is the principal adviser and staff assistant to the Director of Defense Research and Engineering (DDR&E) for ground environment support of -

1. Research, Development, Test and Evaluation (RDT&E) missile programs, and

2. All space programs.

V. FUNCTIONS

Under the direction and within the authority of the Director of Defense Research and Engineering, the Assistant Director (Ranges and Space Ground Support) shall perform the following functions:

1. Establish and maintain inventory records of all national ground environment support of all space programs.

2. Establish and maintain inventory records of all ground environment support at missile ranges, and missile training and test facilities.

3. Establish and maintain inventory of plans for development, procurement and installation of new equipment covered by 1. and 2., above.

4. Establish and maintain an inventory of test plans requiring use of available and projected ground environment support.

5. Collect and maintain long-range launch schedule information and utilization plans for the above ground environment support.

6. Recommend to the DDR&E assignment of missile and space RDT&E programs to the appropriate range.

7. Recommend to the DDR&E the approval, modification or disapproval, of:

   (a) All DoD proposals for development, procurement, installation and operation of all ground environment support of the research, development, test and evaluation of missiles and of national space programs.

   (b) Proposals for installation of National Aeronautics and Space Administration (NASA) equipment on DoD sites.

   (c) The establishment of new DoD ground stations used in support of missile and space RDT&E programs.

8. Coordinate as appropriate to avoid unnecessary duplication, all DoD and NASA proposals for procurement and installation of ground environment support of space programs.

9. Recommend to DDR&E resolution of conflicts arising in the assignment and utilization of ranges and launch facilities.

10. Recommend to DDR&E, in connection with the foregoing, appropriate steps (including the transfer, reassignment, abolition and consolidation of functions) to provide within the Department of Defense for more effective, efficient and economical administration and operation; to eliminate unnecessary duplication; or to contribute to improved military preparedness.

11. Such other functions as the DDR&E may assign.

VI. RELATIONSHIPS

In the performance of his functions, the Assistant Director (Ranges and Space Ground Support) acting under the authority of the DDR&E will:

1. Provide principal point of contact in DoD for matters involving:

   Ground environment support of NASA, or conversely NASA support of DoD, and for joint use of resources for mutual support and coordination with NASA development programs for new ground environment and instrumentation.

2. Recommend requests as appropriate to the Joint Chiefs of Staff, Military Services, or other agencies for such support as may be required to meet the needs of a specific project.

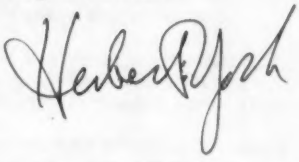
3. Recommend action by other offices of the Office of the Secretary of Defense, as appropriate, on matters related to ground environment support.

VII. AUTHORITY

Pursuant to the authority delegated to the Director of Defense Research and Engineering, the Assistant Director (Ranges and Space Ground Support) is hereby authorized to obtain such reports and information (in accordance with the provisions of DOD Directives 7700.1 and 5158.1) from the Military Departments and other Department of Defense agencies as may be necessary to the performance of his assigned functions.

VIII. EFFECTIVE DATE

This Instruction is effective on publication.



Director, Defense Research and Engineering

APPENDIX IV—ARTICLES OF INCORPORATION, PRESS RELEASE, AND BIOGRAPHIES OF OFFICERS OF AEROSPACE CORPORATION

THE AEROSPACE CORPORATION

ARTICLES OF INCORPORATION

and

BY-LAWS

June 4, 1960

2400 EAST EL SEGUNDO BOULEVARD

EL SEGUNDO, CALIFORNIA

ARTICLES OF INCORPORATION

of

THE AEROSPACE CORPORATION

Under the Laws of the State of California

KNOW ALL MEN BY THESE PRESENTS:

THE UNDERSIGNED do hereby associate themselves for the purpose of forming a nonprofit corporation under and pursuant to the General Nonprofit Corporation Law of the State of California, under the provisions of Part 1 of Division 2 of Title 1 of the Corporations Code, for the purposes set forth in these Articles of Incorporation.

AND WE DO HEREBY CERTIFY:

FIRST: The name of this corporation (hereinafter called "the Corporation") is The Aerospace Corporation.

SECOND: The purposes of the Corporation are exclusively scientific, as herein set forth: to engage in, assist and contribute to the support of scientific activities and projects for, and to perform and engage in research, development and advisory services to or for, the United States Government.

THIRD: In order to carry out and achieve the foregoing purpose the Corporation may: (a) act as trustee under any trust created to furnish funds for the principal objectives of the Corporation and receive, hold, administer and expend funds and property subject to such trust; (b) make contracts; (c) borrow money needed for the prosecution of the objectives and purpose of the Corporation, issue its promissory obligations for payment thereof, and pledge by mortgage or otherwise, all or any portion of its property or assets for the repayment thereof; (d) receive by gift, devise, bequest, descent, purchase or otherwise, real or personal property of any and all description, in the State of Californis or elsewhere, which may be necessary or convenient to the furtherance of the objectives and purpose of the Corporation; (e) do all other things requisite, necessary and expedient to the administration and attainment of its purpose that a nonprofit corporation may lawfully do and shall have and may exercise all of the powers now or hereafter conferred upon nonprofit corporations by the laws of the State of California.

FOURTH: The Corporation is organized and exists as a nonprofit corporation without capital stock, does not contemplate the distribution of gains, profits, dividends or net income to, or for the benefit of, its members or any individual, and no part of its net earnings shall inure to them or to their benefit (except that this provision shall not be construed so as to prevent the payment to Trustees, officers or employees of reasonable compensation for services actually rendered to the Corporation). The funds of the Corporation, whether received by gift or otherwise, and regardless of source, shall be used exclusively in the furtherance and promotion of the foregoing purpose of the Corporation, as the directors, designated and hereinafter referred to as Trustees, may from time to time determine. The Corporation shall not engage in propaganda, or otherwise attempt to influence legislation, or intervene in any manner, directly or indirectly, in any political campaign on behalf of any candidate for public office.

FIFTH: The principal office for the transaction of the business of the Corporation is to be located in the County of Los Angeles, State of California.

SIXTH: The number of Trustees of the Corporation shall be not less than three (3), or such greater number as may from time to time be fixed by a by-law duly adopted by the members or by amendment to these Articles of Incorporation. The names and addresses of the persons who are appointed to serve as the first Trustees of the Corporation until the election and qualification of their successors, are as follows:

NAME	ADDRESS
Roswell L. Gilpatric	15 Broad Street New York 5, N. Y.
Charles C. Lauritsen	1201 East California Pasadena 4, Calif.
Roger Lewis	135 East 42nd Street New York 17, N. Y.

The Trustees of the Corporation shall be the members thereof. No Trustee shall continue to be a member after ceasing to be a Trustee and the election of a person as a Trustee shall be likewise an admission to membership in the Corporation.

Said Trustees shall determine the policies and exercise control, supervision and direction of the general management of the Corporation.

SEVENTH: Upon the dissolution or winding up of the Corporation, after adequately providing for its debts and obligations, the Trustees or person or persons in charge of liquidation shall turn over any remaining assets to the United States of America as the Secretary of the Air Force may direct.

IN WITNESS WHEREOF, we have hereunto set our hands on or as of the 1st day of June, 1960.

Roswell L. Gilpatric

Charles C. Lauritsen

Roger Lewis

BY-LAWS

of

THE AEROSPACE CORPORATION

ARTICLE I.

OFFICES

SECTION 1. Principal Office. The principal office of the Corporation shall be in the City of El Segundo, County of Los Angeles, California.

SECTION 2. Other Offices. The Corporation shall also have offices at such other places, either within or without the State of California, as the Board of Trustees may from time to time designate.

ARTICLE II.

CORPORATE SEAL

SECTION 3. Corporate Seal. The corporate seal shall set forth the name of the Corporation and shall have inscribed thereon the words: "Incorporated June 3, 1960, California." Such seal may be engraved, lithographed, printed, stamped, impressed upon, or affixed to any contract, conveyance, or other instrument executed by the Corporation.

ARTICLE III.

MEMBERS' AND TRUSTEES' MEETINGS AND VOTING RIGHTS

This Article III prescribes the regulations for meetings of Members and Trustees who, under Article Fifth of the Articles of Incorporation, are the same persons but who must, because of distinctions drawn by the California General Nonprofit Corporation Law, act in different capacities.

SECTION 4. Place of Meetings. Meetings of the Trustees and Members shall be held at the principal office of the Corporation, or at any place within or without the state designated from time to time by resolution of the Board or by written consent of all Trustees and Members. Any meeting shall be valid wherever held, if held by the written consent of all Trustees and Members, given either before or after the meeting and filed with the Secretary of the Corporation.

SECTION 5. Annual Meeting of Members; Annual and Semi-Annual Meetings of Trustees. The annual meeting of the Members of the Corporation and the Board of Trustees shall be held in the first quarter of each calendar year upon such date and at such time as may be fixed at the last preceding meeting of the Members or the Board of Trustees, and if not so fixed, as fixed by the President or, if he is absent or is unable or refuses to act, by any Vice President or by any two Member-trustees. There shall be a regular semi-annual meeting of the Board of Trustees held approximately six months after the annual meeting of each year at such place and upon such date and at such time as may be fixed by the Board of Trustees at its last preceding meeting, and if not so fixed, as fixed by the President or, if he is absent or is unable or refuses to act, by any Vice President or by any two Member-trustees.

SECTION 6. Notice of Meetings--Waiver. Notices of the annual meetings shall be given at least thirty days prior to the date thereof and notices of special meetings shall be given ten days prior to the date thereof. Each notice shall specify the place, the day, and the hour of the meeting and, in the case of special meetings, the general nature of the business to be transacted. Notice may be given to any Member-trustee personally, by mail, or by telegram; and may be waived in writing by any Member-trustee, either before or after the meeting. Notices of adjourned meetings need not be given except when the adjournment is thirty days or more. Notices shall be given by the President or, if he is absent or is unable or refuses to act, by any Vice President or by any two Member-trustees.

SECTION 7. Quorum--Adjournment. The presence of a majority of the Member-trustees shall constitute a quorum for the transaction of business. In the absence of a quorum, any meeting may be adjourned from time to time by the vote of a majority of Member-trustees present thereat, but no other business may be transacted. At any such adjourned meeting at which a quorum is present, any business may be transacted which might have been transacted at the meeting as originally noticed. The Member-trustees present at a duly called or held meeting at which a quorum is present may continue to do business until adjournment notwithstanding the withdrawal of enough Member-trustees to leave less than a quorum.

SECTION 8. Consent to Meetings. The transactions of any meeting, however called and noticed, shall be as valid as though had at a meeting duly held after regular call and notice, if a quorum be present, and if, either before or after the meeting, each of the Member-trustees not present in person signs a written waiver of notice, or consent to the holding of such meeting, or an approval of the minutes thereof. All such waivers, consents, or approvals shall be filed with the corporate records or made a part of the minutes of the meeting. Any action which, under law, may be taken at a meeting of the Members or Board of Trustees may be taken without a meeting if authorized by a writing signed by all of the Member-trustees and filed with the Secretary of the Corporation.

SECTION 9. Voting Rights--Proxies Prohibited. Each Member-trustee shall be entitled to one vote, and voting rights may not be exercised by proxies.

SECTION 10. Organization. The Chairman of the Board of Trustees or, in his absence, the Vice Chairman shall act as the presiding officer at every meeting of the Member-trustees. If for any reason the Chairman of the Board of Trustees is unable to act as Chairman, a Vice Chairman shall be selected by the Executive Committee. It will be the responsibility of the President to poll the Executive Committee for its selection of a Vice Chairman.

ARTICLE IV.

TRUSTEES

SECTION 11. General Powers. Subject to the limitations of any statute as to action to be authorized or approved by the Members, all corporate powers shall be exercised by or under authority of, and the business and affairs of the Corporation shall be controlled by, the Board of Trustees.

SECTION 12. Number. The number of Trustees shall be fifteen.

SECTION 13. Nominations. There shall be a Nominating Committee consisting of the Chairman of the Board, the President, and three Members of the Corporation to be elected at each annual meeting of the Members. No one shall serve on the Nominating Committee during the year preceding the annual meeting at which (his term expiring) he is eligible for reelection as a Member-trustee. As soon as possible after the semi-annual meeting of the Trustees, the President shall notify the Committee and the Member-trustees whose terms are not expiring at the conclusion of the ensuing annual meeting of the trusteeships to be filled; and each may submit nominations for such vacancies. The Nominating Committee shall consider all nominations and make its recommendations regarding the nominees at least thirty days prior to the ensuing annual meeting of the Members, said recommendations to be expressed in writing and sent to each Member-trustee whose term does not expire at the conclusion of the ensuing annual meeting. No other nomination shall be received at the meeting except with the unanimous consent of the Members present. At the request of the Chairman, or Vice Chairman, the Nominating Committee also shall make its recommendations concerning persons to be elected at any special meeting of the Members at which a vacancy on the Board is to be filled.

SECTION 14. Qualifications. One or more Trustees shall be Management Trustees and shall be officers of the Corporation, one of whom shall be the President. The other Trustees shall be

selected, to the extent practicable, from persons who will provide representation for each of three classifications: (a) Industrial Trustees, who are from or representative of industry; (b) Academic and Scientific Trustees, who are from academic institutions of higher learning or engaged in scientific research and development, or who devote a majority of working time to the service of such academic institutions or to scientific research and development; and (c) Public Interest Trustees, who have an awareness and appreciation of the public and governmental interest in the projects of the Corporation.

SECTION 15. Term. The regular term of office of each Trustee shall be five years and until the adjournment of the meeting of the Members at which a successor is elected who qualifies, provided that the term of office of any Trustee elected to fill an unexpired term may, by the resolution electing such Trustee, be determined to be for the regular term or for the same term as that of the Member-trustee whose unexpired term is being filled. The term of office of any Trustee, other than Management Trustees, who has served fourteen consecutive years or two consecutive terms of five years each, whichever is shorter, shall expire at the adjournment of the annual meeting of the Members for the year of expiration. No such Trustee, other than Management Trustees, shall be eligible for reelection until the commencement of the annual meeting of the Members for the year following the year of expiration. No Trustee shall be eligible to serve beyond the adjournment of the first annual meeting of the Members following his attaining the age of seventy years.

SECTION 16. Election. Trustees to fill vacancies arising from the expiration of terms or for any other reason shall be elected by the Members at their annual meeting or, if not so elected, at any special meeting held for that purpose.

SECTION 17. Resignation and Vacancies. Any Trustee of the Corporation may resign at any time by giving written notice to the President or to the Secretary of the Corporation, or to the Board of Trustees. Such resignation shall take effect at the time specified therein; and unless otherwise specified therein the acceptance of such resignation shall not be necessary to make it effective.

A vacancy or vacancies shall be deemed to exist in case of the death, resignation, or removal of any Trustee, or if the Members shall increase the authorized number of Trustees but shall fail to elect the additional Trustees so provided for, or in the event the Members fail at any time to elect the full number of authorized Trustees.

Vacancies in the Board may be filled by vote of a majority of the remaining Trustees, though less than a quorum, and each Trustee so elected shall hold office for the unexpired term of his predecessor and until his successor is elected at an annual meeting or at a special meeting called for that purpose. If any Trustee tenders his resignation to the Board, the Board shall

have power to elect a successor to take office at such time as the resignation becomes effective. No reduction of the number of Trustees shall have the effect of removing any Trustee prior to the expiration of his term of office.

SECTION 18. Compensation. Member-trustees shall be entitled to receive for their services such amounts as the Members or the Board of Trustees may by resolution from time to time determine, together with the expenses of attendance, if any, at meetings of Members and Trustees; provided, however, that nothing herein contained shall be construed to preclude any Member-trustee from serving the Corporation in any other capacity or receiving compensation for any such service. Management Trustees shall not be allowed any fee for attendance at meetings.

ARTICLE V.

COMMITTEES

SECTION 19. Executive Committee. The Executive Committee shall be elected annually at the annual meeting of the Board of Trustees and shall consist of the Chairman of the Board, the President and one other officer of the Corporation and, in addition, two Trustees. The Executive Committee shall, between meetings of the Board of Trustees, have all the powers and duties of the Board except as to such matters which the Board has, by resolution, expressly reserved to it. Four shall constitute a quorum and the Committee may act only upon the affirmative vote of four of its members; provided that if at any time any such member is absent from the continental United States or otherwise is unavailable or unable to act, the remaining members of the Executive Committee may elect any other Trustee as an alternate member with the same powers and duties as any other member to serve until the next meeting of the Trustees.

SECTION 20. Procedures for the Executive Committee. The Chairman for the Executive Committee shall be appointed or elected at the time of its establishment. The Committee shall make such rules and regulations as from time to time it may deem proper for its own government and for the transaction of business of the Corporation and shall make a written report of its action to the Board of Trustees at each meeting thereof. Committee meetings shall be held on the call of any member of the Committee but the Committee shall be deemed to be in continuous session and, between called meetings, may act upon the vote of its members, taken by telephone or otherwise.

SECTION 21. Miscellaneous Committees. The Board of Trustees may appoint such other committees as the business of the Corporation may require.

SECTION 22. Vacancies. A vacancy occurring in the Executive Committee may be filled by the remaining members thereof, and any vacancy in the other committees shall be filled by the Executive Committee.

ARTICLE VI.

OFFICERS

SECTION 23. Number. The officers of the Corporation shall be a President, one or more Vice Presidents, a Secretary, a Treasurer and such other officers as may be appointed in accordance with the provisions of Section 25 of these by-laws.

SECTION 24. Election, Term of Office and Qualifications. Each officer, except such officers as may be appointed in accordance with the provisions of Section 25 of these by-laws, shall be chosen annually by the Board of Trustees and shall hold his office until his successor shall have been duly chosen and qualified, or until his death, or until he shall resign, or until he shall have been removed in the manner hereinafter provided.

SECTION 25. Subordinate Officers, etc. The Board of Trustees may appoint such other officers or agents as the business of the Corporation may require, including one or more Assistant Treasurers, and one or more Assistant Secretaries, each of whom shall hold office for such period, have such authority and perform such duties as are provided in these by-laws or as the Board of Trustees may from time to time determine. The Board of Trustees may delegate to any officer or committee the power to appoint any such subordinate officers, committees or agents.

SECTION 26. Removal. Any officer may be removed, either with or without cause, by the vote of a majority of the whole Board of Trustees at any meeting of the Board, or, except in case of any officer elected by the Board of Trustees, by any committee or superior officers upon whom such power of removal may be conferred by the Board of Trustees.

SECTION 27. Resignations. Any officer may resign at any time by giving written notice to the Board of Trustees, or to the President, or to the Secretary of the Corporation. Any such resignation shall take effect at the time specified therein; and, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective.

SECTION 28. Vacancies. A vacancy in any office because of death, resignation, removal, or disqualifications or any other cause, may be filled for the unexpired portion of the term by the Executive Committee.

SECTION 29. The President. The President shall be the chief executive officer of the Corporation and shall have general supervision over the business of the Corporation and over its several officers, subject, however, to the control of the Board of Trustees and its Executive Committee. He may sign and execute, in the name of the Corporation, deeds, mortgages, bonds, contracts, or other instruments authorized by the Board of Trustees, except in cases where the signing and execution thereof shall be expressly delegated by the Board of Trustees or by these by-laws to some other officer or agent of the Corporation; and, in general, shall perform all duties incident to the office of the chief executive officer of the Corporation, and such other duties as from time to time may be assigned to him by the Board of Trustees. He shall, whenever it may be necessary in his opinion, prescribe the duties for officers and employees of the Corporation whose duties are not otherwise defined.

SECTION 30. Vice Presidents. At the request of the President, or in his absence or disability, the Vice Presidents, in the order designated by the Board of Trustees, shall perform all the duties of the President and, when so acting, shall have all the powers of, and be subject to all the restrictions upon, the President. The Vice Presidents also may sign and execute, in the name of the Corporation, deeds, mortgages, bonds, contracts, or other instruments authorized by the Board of Trustees, except in cases where the signing and execution thereof shall be expressly delegated by the Board of Trustees or by these by-laws to some other officer or agent of the Corporation; and shall perform such other duties as from time to time may be assigned to them by the Board of Trustees or the President.

SECTION 31. The Secretary. The Secretary shall:

(a) Certify and keep at the principal office of the Corporation the original or a copy of its by-laws as amended or otherwise altered to date.

(b) Keep at the principal office of the Corporation or such other place as the Board of Trustees may order, a book of minutes of all meetings of its Members with the time and place of holding, whether regular or special and, if special, how authorized, the notice thereof given, and the names of those present at the meetings.

(c) See that all notices are duly given in accordance with the provisions of these by-laws or as required by law.

(d) Be custodian of the records and of the seal of the Corporation and see that it is engraved, lithographed, printed, stamped, impressed upon, or affixed to all documents the execution of which on behalf of the Corporation under its seal is duly authorized in accordance with the provisions of these by-laws.

(e) See that the books, reports, statements, and all other documents and records required by law are properly kept and filed.

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(f) Exhibit at all reasonable times to any Trustee, upon application, the by-laws and minutes of proceedings of the Members and Trustees of the Corporation.

(g) In general, perform all duties incident to the office of Secretary, and such other duties as from time to time may be assigned to him by the Board of Trustees.

SECTION 32. The Treasurer. The Treasurer, if required so to do by the Board of Trustees, shall give a bond for the faithful discharge of his duties in such sum, and with such sureties, as the Board of Trustees shall require. The Treasurer shall:

(a) Have charge and custody of, and be responsible for, all funds and securities of the Corporation, and deposit all such funds in the name of the Corporation in such banks, trust companies or other depositaries as shall be selected by the Board of Trustees.

(b) Keep and maintain adequate and correct accounts of the Corporation's properties and business transactions, including account of its assets, liabilities, receipts, disbursements, gains, losses, capital and surplus.

(c) Exhibit at all reasonable times the books of account and records to any Trustee during business hours at the office of the Corporation where such books and records are kept.

(d) Render a statement of the condition of the finances of the Corporation at all meetings of the Board of Trustees, and a full financial report at the annual meeting of the Board.

(e) Receive, and give receipt for, moneys due and payable to the Corporation from any source whatsoever.

(f) In general, perform all the duties incident to the office of Treasurer and such other duties as from time to time may be assigned to him by the Board of Trustees.

SECTION 33. Salaries. The salaries of the President and Vice Presidents shall be fixed from time to time by the Board of Trustees. The salaries of the Secretary and Treasurer shall be fixed from time to time by the Executive Committee based upon the recommendations of the President. No such officer shall be prevented from receiving such salary by reason of the fact that he is also a Trustee of the Corporation.

ARTICLE VII.

CONTRACTS, CHECKS, DRAFTS, BANK ACCOUNTS, ETC.

SECTION 34. Contracts, etc. How Executed. The Board of Trustees, except as in these by-laws otherwise provided, may authorize any officer or officers, agent or agents, to enter into any contract or execute and deliver any instrument in the name of and on behalf of the Corporation, and such authority may be general or confined to specific instances; and, unless so authorized, no officer, agent or employee shall have any power or authority to bind the Corporation by any contract or engagement or to pledge its credit or to render it liable pecuniarily for any purpose or in any amount.

SECTION 35. Loans. No loans shall be contracted on behalf of the Corporation and no negotiable paper shall be issued in its name, unless and except as authorized by the Board of Trustees. When so authorized by the Board of Trustees, any officer or agent of the Corporation may effect loans and advances at any time for the Corporation from any bank, trust company, or other institution, or from any firm, corporation or individual, and for such loans and advances may make, execute and deliver promissory notes, bonds, or other evidences of indebtedness of the Corporation, and, when authorized as aforesaid, as security for the payment of any and all loans, advances, indebtedness, and liabilities of the Corporation, may pledge, hypothecate or transfer any and all stocks, securities, and other personal property at any time held by the Corporation, and to that end endorse, assign and deliver the same.

SECTION 36. Deposits. All funds of the Corporation shall be deposited from time to time to the credit of the Corporation with such banks, bankers, trust companies or other depositaries as the Board of Trustees may select or as may be selected by any officer or officers, agent or agents of the Corporation to whom such power may be delegated from time to time by the Board of Trustees.

SECTION 37. Checks, Drafts, etc. All checks, drafts or other orders for the payment of money, notes, acceptances, or other evidences of indebtedness issued in the name of the Corporation, shall be signed by such officer or officers, agent or agents, of the Corporation, and in such manner as shall be determined from time to time by resolution of the Board of Trustees. Endorsements for deposit to the credit of the Corporation in any of its duly authorized depositaries may be made without countersignature, by the President or any Vice President, or the Treasurer or any Assistant Treasurer, or by any other officer or agent of the Corporation, to whom the Board of Trustees, by resolution, shall have delegated such power, or by hand-stamped impression in the name of the Corporation.

SECTION 38. General and Special Bank Accounts. The Board of Trustees from time to time may authorize the opening and keeping of general and special bank accounts with such banks, trust companies or other depositaries as the Board of Trustees may select and may make such rules and regulations with respect thereto, not inconsistent with the provisions of these by-laws, as they may deem expedient.

ARTICLE VIII.

FISCAL YEAR

SECTION 39. Fiscal Year. The fiscal year of the Corporation shall be fixed by resolution of the Board of Trustees.

ARTICLE IX.

WAIVER OF NOTICE

SECTION 40. Waiver of Notice. Whenever any notice whatever is required to be given by statute or these by-laws, a waiver thereof, in writing, signed by the person or persons entitled to said notice, whether before or after the time stated therein, shall be deemed equivalent thereto.

ARTICLE X.

AMENDMENTS

SECTION 41. Amendments. Any of these by-laws may be altered, amended or repealed, and new by-laws may be adopted, at any meeting of the Members. The authority to adopt, repeal and amend by-laws is hereby expressly delegated to the Board of Trustees and any of these by-laws may be altered, amended or repealed or any new by-laws may be adopted by the affirmative vote of a majority of the whole Board of Trustees at any meeting thereof.

FROM: THE AEROSPACE CORPORATION
2400 EL SEGUNDO BOULEVARD
EL SEGUNDO, CALIFORNIA

THE AEROSPACE CORPORATION, FORMED TO SERVE THE AIR FORCE IN SCIENTIFIC-TECHNICAL PLANNING AND MANAGEMENT OF ITS MISSILE-SPACE PROGRAMS

FOR RELEASE: After 1:00 p.m (PDT) Saturday, June 25, 1960

INGLEWOOD, CALIFORNIA. (June 25) -- The formation of a new non-profit organization, The Aerospace Corporation, to serve the Air Force in the scientific and technical planning and management of missile-space programs, was announced here today.

Mr. Roswell Gilpatric, Chairman of the Board of Trustees of Aerospace Corporation, disclosed that it is assuming under contract with the Air Force certain tasks previously performed by Space Technology Laboratories as well as new missile weapon systems and such companion space systems as satellites for early warning, reconnaissance, communications and advanced planning for other military space systems. Aerospace will also engage in the supporting advanced research and development in these fields.

The announcement was made at a press conference which took place at the Headquarters of the Air Force Ballistic Missile Division and which was held in conjunction with the final organizing meeting of the new corporation's Board of Trustees.

To avoid disruption in the development program for the national priority ATLAS, TITAN and MINUTEMAN weapon systems, the Air Force will continue these under contract with Space Technology Laboratories for systems engineering and technical direction.

The Aerospace Corporation will seek to accelerate programs in such areas as advanced re-entry vehicles, including penetration aids, new propulsion and guidance systems, satellite communications systems, satellite inspection systems, manned military space systems and other corollary undertakings.

In welcoming the advent of The Aerospace Corporation, Under Secretary of the Air Force Joseph V. Charyk said, "The Aerospace Corporation comes into existence as a logical step in the evolutionary development of the Air Force's management of its ballistic missile and military space system programs. The Corporation, through its unique role, will help to insure that the full technical resources of the nation are properly applied and that the potential advances in the missile and space field are realized in the shortest possible time." He said that, "The new corporation should be regarded as an undertaking which has been designed for permanence and stability and which will provide the Air Force missile and space efforts the assistance of an objective and technically highly competent organization."

He pointed out further, "That Aerospace Corporation will, under over-all Air Force management, concern itself with advanced systems analysis and planning, research, experimentation, initial systems engineering, initial technical direction and general technical supervision in the complete field of Air Force ballistic and space systems. It is intended that the detailed development systems engineering and detailed technical direction will be the responsibility of normal private industry."

Secretary Charyk stated that as soon as contractual reorientation has been accomplished, the competitive restrictions in military and space systems programs which heretofore have been imposed upon Thompson Ramo-Wooldridge and Space Technology Laboratories by the Air Force will be limited to those weapon systems in which Space Technology Laboratories retains systems engineering and technical direction responsibility, now planned to include ATLAS, TITAN, and MINUTEMAN.

The emergence of The Aerospace Corporation as a new military management resource, Mr. Gilpatric said, reflects that findings and recommendations of studies conducted by the Air Force, of various Congressional inquiries and of a survey recently carried out on Air Force initiative by a committee of distinguished scientists and industrialists under the chairmanship of Dr. Clark B. Millikan.

Mr. Gilpatric disclosed that during the next sixty days it is expected that Aerospace, with the cooperation of Space Technology Laboratories, will invite experienced people from Space Technology Laboratories who have been primarily involved in activities which will now be the responsibility of the new corporation to form the nucleus of this organization. Within the next several months the Corporation also intends to hire significant numbers of technical and administrative personnel, in addition to those which will be acquired from Space Technology Laboratories. Mr. Gilpatric indicated that Aerospace would move to recruit top talent from available sources around the country in order to fill a variety of important positions in connection with Aerospace's new responsibilities in such programs as SAMOS, MIDAS, DISCOVERER, and other military space systems in an earlier stage of development.

It is anticipated that The Aerospace Corporation may, upon occasion, be called upon to accept contracts from government agencies other than the Air Force.

To conduct its operation, Aerospace will utilize extensive laboratory and other facilities at the El Segundo Research and Development Center which the Air Force is purchasing from Space Technology Laboratories. These facilities will be initially shared by The Aerospace Corporation, the Air Force Ballistic Missile Division, the Ballistic Missile Center, and units of Space Technology Laboratories serving Air Force programs.

The national importance of The Aerospace Corporation, Dr. Charyk pointed out, is indicated by its distinguished Board of Trustees, with Mr. Roswell Gilpatric, partner of Cravath, Swaine & Moore, as Chairman, and Dr. Charles C. Lauritsen, Professor of Physics, California Institute of Technology, Head of the Executive Committee. Other members of the Board, representing a cross-section of science, industry, government administration and education are:

Dr. Clifford C. Furnas
President of the University of Buffalo

Mr. Trevor Gardner
Chairman and President of the Hycon Manufacturing Company

Mr. Edwin E. Huddleson, Jr.
Cooley, Crowley, Gaither, Godward, Castro & Huddleson

Mr. Roger Lewis
Vice President, Pan American World Airways, Inc.

Major General James McCormack, USAF (Ret)
Vice President, Massachusetts Institute of Technology

General Earle E. Partridge
United States Air Force (Ret)

Mr. Arthur Raymond
Former Vice President, Engineering, Douglas Aircraft Company

Dr. Chalmers W. Sherwin
Professor of Physics, University of Illinois

Dr. Jerome B. Wiesner
Director, Research Laboratory of Electronics
Massachusetts Institute of Technology

Also attending the press conference was Lt General Bernard A. Schriever, Commander, Air Research and Development Command, who stated, "Sometime ago it became evident that the basic management concept of the Air Force missile and space program -- a concept which has accounted since 1954 for the great acceleration of the United States ballistic missile and space programs -- had to be perpetuated in a stable and permanent form in order to effectively keep pace with the emerging needs of space power. The Aerospace Corporation is designed to meet those needs for today and tomorrow."

This point of view was endorsed by Brigadier General Charles H. Terhune, Jr., representing Major General O. J. Ritland, Commander of Air Force Ballistic Missile Division, who said, "The Aerospace Corporation represents the Air Force's constant search for the most effective way to organize scientific and technical knowledge in the research, development, and deployment of military space systems."

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ROSWELL L. GILPATRIC

Chairman of the Board of Trustees

Born Brooklyn, New York, November 4, 1906

Present home--124 East 62nd Street, New York 21, N. Y.

Graduate of Hotchkiss School 1924 (Cum Laude), Yale College 1928 (Phi Beta Kappa) and Yale Law School 1931 (Editor, Yale Law Journal)

Visiting Sterling Lecturer, Yale Law School 1939-42 and 1946-48

Partner of Cravath, Swaine & Moore since 1940 (except 1951-53)

Under Secretary of the Air Force 1951-53

Panel member of Rockefeller Studies Project 1956-57

Member of Council on Foreign Relations and director of Foreign Policy Association

Member of Yale University Council

Trustee of Woodrow Wilson Foundation

Member of Advisory Panel to the Joint Congressional Subcommittee on Military Application of Atomic Energy

Member of New York State Defense Council

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DR. CHARLES C. LAURITSEN

Chairman of the Executive Committee

Dr. Charles C. Lauritsen was born in Holstebro, Denmark, on April 4, 1892. He was naturalized in 1928. He married in 1915 and has one son, Thomas.

Graduated from Odense Teknike Skole, Odense, Denmark (1911); Ph.D. in physics California Institute of Technology (1929); Assistant Professor of Physics, California Institute of Technology (1930-1931); Associate Professor of Physics, California Institute of Technology (1931-1935); Professor of Physics, California Institute of Technology (1935-present); Staff member, Project VISTA (1951-1952).

As head of the W. K. Kellogg Radiation Laboratory supervises approximately sixty technical, support personnel, graduate students, and research fellows in the research of energy levels of light nuclei.

War service: 1940-1942, Vice Chairman, Division A, NDRC; 1942, Chairman Section L, Division 3, OSRD; Duration, Director of Research, OSRD Contract OEMer-418; Member, Scientific Advisory Council, Ballistics Research Laboratory, Aberdeen Proving Ground, Maryland.

Memberships: Past President, Fel. Amer. Phys. Soc.; fel. College of Radiology; member Nat. Acad. Sci, Amer. Philosophical Soc., Amer. Assoc. Adv. Sci; foreign member of the Det. Kgl. Danske Vidensk Selsk (Royal Society of Copenhagen); member Sigma Xi.

Served on the following committees, boards and panels for the U. S. Government; U. S. - U. K. Joint Committee (Dept. of Defense); Sci. Adv. Comm., Ballistic Missiles Div. (Air Force); Adv. Group on Special Capabilities (OASD, R and D.) Tech. Adv. Panel on Ord. (OASD, R and D); Sci. Adv. Comm (ODM); Sci. Adv. Panel (Dept. of the Army); Nuclear Phys. Panel (ONR); Explosives and Armament Panel SAB (Air Force); Armament Adv. Group (ARDC); NOTS Adv Brd (USN); Sci. Adv. Brd. (Air Force); High Card Comm (SAB, USAF); Weapons Systems Evaluation Grp (OASD, R and D).

Current Advisory and Consulting activities (May 1960), U. S. Government:

Scientific Advisory Committee to the Secretary of Defense; Scientific Advisory Board, USAF; Pacific Missile Range Advisory Board; USN; President's Science Advisory Committee, White House; Army Scientific Advisory Panel, USA; Advisory Board NOTS; Special Task Group, AFBMD (ARDC, USAF).

Awards:

Gold Medal, from American College of Radiology (1931).

Naval Ordnance Development Award (In appreciation of Exceptional Service to Naval Ordnance Development, 10 December 1945).

Medal for Merit, awarded by the President of the U. S., March 1948 "***In recognition of your outstanding contributions to the war effort of the United States."

Knight Kommander of Dannebrog, presented by Royal Danish Consulate, Los Angeles, for the King of Denmark, October 1953.

Certificate of Appreciation, for Patriotic Civilian Service, by the Department of the Army (Secretary of the Army Frank Pace, February 1953).

Certificate of Appreciation, U.S.A.F., December 1955.

Distinguished Civilian Service to the Army, by Secretary of the Army, W. W. Brucker, October 21, 1957.

Captain Robert Dexter Conrad Award, for Scientific Achievement, U.S.N. (1958).

DR. CLIFFORD C. FURNAS

Member of the Board of Trustees

Dr. Clifford C. Furnas was born October 24, 1900, at Sheridan, Indiana. He holds the degree of Bachelor of Science, with honors, from Purdue, 1922, of Doctor of Philosophy from the University of Michigan, 1926, of Honorary Doctor of Engineering from Purdue, 1946 and from the University of Michigan, 1957, and of Honorary Doctor of Laws from Alfred University, 1958. While in school he was a long distance runner of distinction, and competed in the 5,000 meter event at the Olympic Games in Antwerp in 1920. In 1922 he was awarded the Big 10 Conference Medal for the best combined scholastic and athletic record.

He has always had a sustained interest in both research and education and his working career reflects this duality. From 1926 to 1931 he conducted research work on metallurgical processes at the U. S. Bureau of Mines at Minneapolis, Minnesota. In the latter year he joined Yale University as associate professor in chemical engineering. In 1941 and 1942 he worked for the National Defense Research Committee, coordinating a large research and development program. He was appointed by Curtiss-Wright as director of its aeronautical research laboratory in Buffalo in February, 1943. This Laboratory was given to Cornell University on January 1, 1946, and he became Director and Executive Vice President of Cornell Aeronautical Laboratory. He assumed the post of Chancellor of the University of Buffalo, September 1, 1954. On December 1, 1955, Dr. Furnas was granted a leave of absence by the University to serve as Assistant Secretary of Defense for Research and Development in Washington, D. C. He returned to his UB post, February 15, 1957. For a number of years he has been an active member of various technical boards and panels for the government, particularly in the Department of Defense. Chairman of Army Scientific Advisory Panel; Chairman of New York State Advisory Council for the Advancement of Industrial Research and Development.

While Dr. Furnas has conducted a great deal of research in the fields of process metallurgy, he has specialized in and has written many technical articles on chemical and chemical engineering subjects as well as on phases of research related to aviation. In addition to technical and educational articles he has written several books, including "America's Tomorrow" (1932); "The Next Hundred Years", a Book-of-the-month Club selection in January 1936; "Man, Bread, and Destiny", written with his wife, S. M. Furnas (1937); and "The Storehouse of Civilization" (1939).

He was editor of the sixth edition of Roger's "Manual of Industrial Chemistry" (1942). He was also editor of the Industrial Research Institute monograph on "Industrial Research - Its Organization and Management" (1948).

He is a member of Theta Chi, social fraternity, various honorary fraternities, social clubs in New York and Washington and of several scientific and engineering societies. He is a registered professional engineer in the states of New York and Connecticut.

TREVOR GARDNER

Member of the Board of Trustees

Trevor Gardner was born in Cardiff, Wales, on August 24, 1915. He became an American citizen in 1937. He received a Bachelor of Science degree in Engineering from the University of Southern California in 1937 and a Masters degree in Business Administration from the same school in 1939. USC awarded the degree of Doctor of Science to Mr. Gardner in 1955. He is a member of the honorary engineering fraternity, Tau Beta Pi.

Mr. Gardner completed the General Electric test engineering course in 1938 and then returned to the University of Southern California to teach freshman mathematics while obtaining his Masters degree. He subsequently taught industrial management subjects at the University of Southern California and the California Institute of Technology. During World War II, Mr. Gardner was Head of Developmental Engineering on the Office of Scientific Research and Development rocket and atomic bomb projects at the California Institute of Technology. He was awarded the Presidential Certificate of Merit and the Naval Ordnance Award for his work on these projects.

After World War II, Mr. Gardner became associated with General Tire and Rubber Company of California as Executive Vice President. He subsequently formed the Hycon Mfg. Company, of which he was president from 1948 to February 1953, when he resigned to accept the position of Special Assistant for Research and Development to the Secretary of the Air Force in Washington, D. C. Mr. Gardner was appointed Assistant Secretary of the Air Force, Research and Development, on February 28, 1955. He resigned this office February 11, 1956.

Mr. Gardner has been Chairman of the Board and President of Hycon Mfg. Company in Pasadena, California, since May, 1956. He is also Consultant-at-Large on the United States Air Force Scientific Advisory Board to the Chief of Staff, and a member of the Advisory Committee on Science and Technology of the National Democratic Advisory Council.

EDWIN E. HUDDLESON, JR.

Member of the Board of Trustees

Born in Oakland, California, January 28, 1914. Grew up in Santa Cruz, California. Attended Leland Stanford Junior University from 1931 to 1935; was a member of Phi Beta Kappa and received an A.B. degree in Political Science. Attended Harvard Law School from 1935 to 1938; was President of the Harvard Law Review in 1938; graduated magna cum laude and was awarded the Fay Diploma.

From July 1938 to June 1939 was law clerk to Judge Augustus N. Hand, United States Circuit Court of Appeals for Second Circuit, in New York City. From June 1939 to February 1940 and from July 1940 to February 1941 was an attorney in the Office of the Solicitor General, Department of Justice, Washington, D. C. From February 1940 to July 1940 was law clerk to Mr. Justice Frank Murphy of the United States Supreme Court.

Drafted into United States Army in February 1941; served in Counter Intelligence Corps; commissioned in April, 1942 and served in Military Intelligence in Washington, D.C. and in Oahu, T.H. Released from the Army in January 1946 with rank of Lt. Colonel.

From January 1946 to December 1946 was Director, Special Projects Staff, in the State Department under the Special Assistant for Research and Intelligence. Left the State Department in December 1946 to become Deputy General Counsel of the United States Atomic Energy Commission.

Left Government service in January 1949 to become a partner in the San Francisco law firm of Cooley, Crowley & Gaither, which became Cooley, Crowley, Gaither, Godward, Castro & Huddleson in 1954.

Trustee of RAND Corporation, MITRE Corporation and System Development Corporation.

Married to Mary Taeusch. They have three children: Michael Stephen, age 18; Edwin E. III, age 15; and Mary Catherine, age 11.

ROGER LEWIS

Member of the Board of Trustees

Ex-government official; born Los Angeles, January 11, 1912; son of Clarence Vernon and Charlotte (Gibbons) Lewis; A. B., Stanford, 1934; married Elly Thummler, March 8, 1938; children - Ronald, Gail, Pamela.

Director of materiel, assistant sales manager Lockheed Aircraft Corporation, 1934-47; vice president Canadair Ltd., Montreal, Canada, 1947-50; vice president Curtiss-Wright Corporation, 1950-53; assistant secretary of Air Force, 1953-55; executive vice present - administration, director Pan American World Airways, 1955, and member of the Executive Committee of the Board of Directors of Pan American World Airways, 1960. Recipient Medal of Freedom, 1955. Member Institute of Aeronautical Sciences and the Council on Foreign Relations, Sigma Nu. Clubs: Links, University and Cloud in New York. Home: 120 East 81st Street, New York City. Office: 135 East 42nd Street, New York City.

MAJOR GENERAL JAMES McCORMACK, JR., USAF (RET.)

Member of the Board of Trustees

James McCormack, Jr., was born at Chatham, Louisiana, November 8, 1910. He was graduated from Riverside Military Academy in Georgia and appointed to the U. S. Military Academy in 1928. He was graduated from the Academy and commissioned a second lieutenant in the Corps of Engineers June 10, 1932.

After receiving his commission, he went to England to enter Oxford University on a Rhodes Scholarship and three years later received his Bachelor of Arts degree in languages from Oxford.

General McCormack then returned to the United States and in September 1935, was assigned to the Eighth Engineers at Fort McIntosh, Texas. In May 1936, he entered Massachusetts Institute of Technology where he received his Master of Science degree in civil engineering a year later. His next assignment was as assistant to the District Engineer at Boston, Massachusetts.

In September 1937, General McCormack entered the Engineer School at Fort Belvoir, Virginia, and after graduating the following June was named assistant engineer on the Reservoir Project at Sardi, Mississippi. In October 1939, he became a company commander with the 21st Engineer Regiment at Fort Benning, Georgia, and eight months later was named regimental adjutant of the 20th Engineer Regiment at that station. In December 1940, he assumed command of a battalion of the 20th Regiment at Fort Benning. He became commander of the 76th Engineer Company at Fort McClellan, Alabama, in July 1941.

A year later, General McCormack was assigned to the War Department General Staff, Washington, D. C., as assistant chief of the Construction and Allowances Branch. In March 1943, he became chief of the Construction Branch, War Department General Staff.

General McCormack went overseas in October 1943, to become chief of the Movements Branch, First Army Group, in Europe, and the following July was named chief of the Movements Branch, 12th Army Group in that theater.

In May 1945, he returned to the United States and was reassigned to the War Department General Staff, Washington, D. C. where he served successively as a member of the Strategy and Policy Group, as assistant chief and chief of the Strategic Policy Section, and as chief of the Politico-Military Survey Section.

General McCormack was appointed director of the Division of Military Application of the Atomic Energy Commission, with station at Washington, D. C. in

February 1947. On July 25, 1950, he was transferred from the Army to the Air Force.

In August 1951, General McCormack was appointed Special Assistant to the Deputy Chief of Staff for Development at Air Force headquarters. He became Director of Nuclear Applications at the Air Research and Development Command headquarters, Baltimore, Maryland, in February 1952, and the following May was named assistant vice commander of that Command. In December 1952, he was appointed deputy commander of that Command, and in July 1953, was redesignated vice commander.

In 1954 General McCormack served as Director of Research and Development for Headquarters USAF. He retired from the Air Force in 1955 and joined the Massachusetts Institute of Technology. His first position there was Special Advisor to Dr. James R. Killian, Jr., then president of the Institute. In July 1957 he succeeded the late Vice Admiral, Edward L. Cochran, as Vice President of the Massachusetts Institute of Technology; the position presently occupied by him.

General McCormack has been awarded the Distinguished Service Medal, the Legion of Merit with one Oak Leaf Cluster, and the Bronze Star Medal. His foreign decorations include the French Legion of Honor, the Croix de Guerre with Palm, and the Order of the British Empire.

General McCormack is married to the former Eleanor Morrow of Kerrville, Texas. They have two children; a daughter, Anne Martha (Mrs. James D. Stanton), and a son, James.

GENERAL EARLE E. PARTRIDGE, USAF (RET.)

Member of the Board of Trustees

Earle Everard Partridge was born at Winchendon, Massachusetts on July 7, 1900. He enlisted in the Army on July 10, 1918 at Fort Slocum, New York and was assigned to the Fifth Engineer Training Regiment at Camp Humphries, Virginia. General Partridge went to France in August 1918 where he joined the 79th Division, participating in the St. Mihiel and Argonne operations prior to the Armistice. When the Division returned to Camp Dix, New Jersey in June 1919, he was honorably discharged.

Following a year at Norwich University, General Partridge re-enlisted in June 1920 and was appointed to the U. S. Military Academy. Graduating from the Academy on June 12, 1942, he was commissioned a second lieutenant of Air Service in the Regular Army.

Entering Primary Flying School at Brooks Field, Texas, the General was graduated from Advanced Flying School, Kelly Field, Texas. After serving ten months in the Third Attack Group there, he was appointed an Instructor at the Advanced Flying School in July 1926, remaining until September 1929 when he became an instructor in mathematics at the Military Academy.

Going to the Panama Canal Zone in October 1930, he was assigned to the Seventh Observation Squadron at France Field, and was later transferred to the Sixth Composite Group there.

In December 1932, General Partridge was assigned to Selfridge Field, Michigan, and in July 1936 went to Wright Field, Ohio as a test pilot. Entering the Air Corps Tactical School at Maxwell Field, Alabama in September of that year, he was graduated the following June and assigned to the Command and General Staff School at Fort Leavenworth, Kansas. He then returned to Maxwell Field as an instructor in the Pursuit Section of the Tactical School. Transferring to the Southeast Air Corps training command in June 1940, he took a major part in establishing flying schools in the southeast. On October 1, 1940 he was sent to Barksdale Field at Shreveport, Louisiana to start an advanced single-engine flying school, going to Dothan, Alabama in May 1941 to supervise construction of the single-engine advanced flying school there.

Five months later the General was assigned to Air Force Headquarters as a member of the Air War Plans Division, and in March 1942 was made a member of the War Department General Staff to serve on the Joint Strategic Committee, Joint Chiefs of Staff. He assumed command of the New York Air Defense Wing in January 1943.

The following spring General Partridge joined the Northwest African Air Force as Operations Officer and Chief of Staff of the 12th Bomber Command, later becoming Chief of Staff and Deputy Commander of the 15th Air Force. In January 1944 he moved to England and became Deputy Commander of the Eighth Air Force, and the following June assumed command of the Third Bombardment Division. At the close of hostilities in the European Theater, General Partridge became Deputy Commander, and later assumed command of the Eighth Air Force and assisted in its reorganization and movement to Okinawa in August 1945.

Returning to Air Force Headquarters in January 1946, the General became Assistant Chief of Staff for Operations. In October of the following year he was appointed Director of Training and Requirements in the Office of the Deputy Chief of Staff for Operations, and soon thereafter was sent to Japan where he commanded the Fifth Air Force from October 1948 to June 1951. With the outbreak of the Korean War, General Partridge moved the Fifth Air Force to Korea and when he later returned to this country he was able to bring to bear his Korean experiences to assist in advancing the Air Force research and development effort as Commander of the newly-formed Air Research and Development Command at Baltimore, Maryland.

Rejoining Air Force Headquarters on June 30, 1953, the General was designated Deputy Chief of Staff for Operations, remaining until April 1, 1954 when he assumed command of the Far East Air Forces at Tokyo, Japan.

On July 20, 1955, General Partridge was named Commander-in-Chief of the Continental Air Defense Command and its Air Force component, the Air Defense Command, with Headquarters at Ent Air Force Base, Colorado Springs, Colorado.

General Partridge retired from the Air Force on July 31, 1959. His position at that time was Commander of the North American Air Defense Command (NORAD), Colorado Springs, Colorado, and since that time has served as an aviation consultant.

His decorations include the Distinguished Service Medal, Legion of Merit, Distinguished Flying Cross, Bronze Star Medal, and the Air Medal with three Oak Leaf Clusters. For his service in the Korean campaign he was also awarded the Distinguished Service Cross, Silver Star, two Oak Leaf Clusters to the DFC, and seven Oak Leaf Clusters to the Air Medal. His foreign decorations include the French Legion of Honor and Croix de Guerre with two Palms; the Polish Order of Polonia Restituta, Chevalier, with Commander's Cross with star; the British Companion of the Order of the Bath; and the Belgian Croix de Guerre with Palm. General Partridge won the Distinguished Aerial Gunner's Medal in 1926, 1927 and 1928. He is rated a command pilot, combat observer, and aircraft observer.

General Partridge is married to the former Elizabeth Cowles. He has two daughters, Patricia Earle and Kay Blythe, by a former marriage.

ARTHUR E. RAYMOND

Member of the Board of Trustees

Arthur Emmons Raymond, retiring senior vice president-engineering, Douglas Aircraft Company, was born in Boston, Massachusetts, March 24, 1899.

He was graduated from Harvard University in 1920 and granted a Masters degree in Aeronautical Engineering at Massachusetts Institute of Technology in 1921. He has an honorary degree of Doctor of Engineering from the Polytechnic Institute of Brooklyn.

Raymond came to Douglas in 1925 as a metal worker, the only position then available, but was shortly transferred to engineering. He became assistant chief engineer in 1927, chief engineer in 1934, and vice president in charge of engineering in 1939. He was named senior vice-president October 22, 1958.

He is a member of the Institute of Aeronautical Sciences and an honorary fellow of the same organization. He was a member of the National Advisory Committee for Aeronautics 1946 to 1956.

Raymond received the U. S. Certificate of Merit for contributions to aircraft production during World War II; awarded a Spirit of St. Louis medal, 1954; and the Daniel Guggenheim Medal for 1957. He is a member of the National Academy of Sciences and has served as a consultant to the Secretary of Defense.

He resides with his wife (Dorothy Lee) at 73 Oakmont Drive, Los Angeles 49, California.

CHALMERS W. SHERWIN

Member of the Board of Trustees

Born November 27, 1916, Two Harbors, Minn. B.S. Wheaton College (Illinois) 1937, Ph.D. (Physics) University of Chicago, 1940. Married Irene Ackerman, 1937. Seven children. Residence, Urbana, Illinois.

Professional Experience: 1941-1945 Staff Member and Group Leader Radiation Laboratory, Massachusetts Institute of Technology. Associate, Columbia University, 1946. Assistant Professor, University of Illinois 1946, Professor, 1952. Chief Scientist, U. S. Air Force, 1954. Associate Director, Coordinated Sciences Laboratory, University of Illinois, 1959.

Areas of Specialization: Nuclear physics, physics of hearing, high resolution radar systems, electronics.

Awards: Presidential Certificate of Merit, 1947. Medal for Exceptional Civilian Services, U. S. Air Force, 1955. Science Award, Air Force Association, 1956.

Societies and Boards: Fellow, American Physical Society. Member, Scientific Advisory Board to the Chief of Staff, U. S. Air Force, 1955-1959, and Consultant, 1959. American Association of Physics Teachers. American Association of University Professors.

Books: "Basic Concepts of Physics", Dryden Press, 1957.
"Introduction to Quantum Mechanics", Henry Holt and Co., 1959.

DR. JEROME B. WIESNER

Member of the Board of Trustees

Dr. Jerome B. Wiesner, professor of electrical engineering, director of the Research Laboratory of Electronics at the Massachusetts Institute of Technology and acting head of the Department of Electrical Engineering, has been a leader in the rapid development of communications sciences. He is chairman of the steering committee of the Center for Communications Sciences, established at M.I.T. in 1958 to study communication processes in both man-made and natural systems.

Dr. Wiesner has also been active in the technology related to America's international problems. He is a member of the President's Science Advisory Committee, was a member of the committee which prepared the Gaither Report, and was staff director of the American Delegation to the 1958 Geneva conference on the prevention of surprise attack.

Dr. Wiesner was born in Detroit, Michigan, in 1915, and received the degrees of bachelor of science, master of science and doctor of philosophy from the University of Michigan in 1937, 1938, and 1950 respectively. While a student at the University of Michigan he was associate director of the University's broadcasting station and assisted in developing modern electronic techniques for use in the Speech Correction Department. He also served as a teacher of radio techniques at the summer National Music Camp at Interlocken, Mich.

In 1940 Dr. Wiesner was appointed chief engineer of the Acoustical and Record Laboratory in the Library of Congress, Washington, D. C. There, under a Carnegie Corporation grant, he assisted in developing sound recording facilities and associated equipment.

Shortly after the beginning of World War II, Dr. Wiesner joined the staff of M.I.T.'s Radiation Laboratory as associate leader of the radio frequency development group. Later he became project engineer of a key radar development program and a member of the laboratory's steering committee. In 1945 Dr. Wiesner joined the

staff of the Los Alamos Laboratory, where he served for a year. Upon his return he resumed his duties as assistant professor at M.I.T.

Eta Kappa Nu Association, the electrical engineering honor society, voted Dr. Wiesner an honorable mention as an outstanding young electrical engineer for the year 1947. In recognition of "outstanding services to his country," he was awarded the President's Certificate of Merit, the second highest civilian award, in 1948. In 1952 Dr. Wiesner was elected a Fellow of the Institute of Radio Engineers for his "outstanding contributions to radio or allied fields." He is a Fellow of the American Academy of Arts and Sciences and a member of the Accoustical Society of America. He is a consultant for the Department of Defense and a member of the Army Scientific Advisory Panel. His home is in Watertown, Mass.

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